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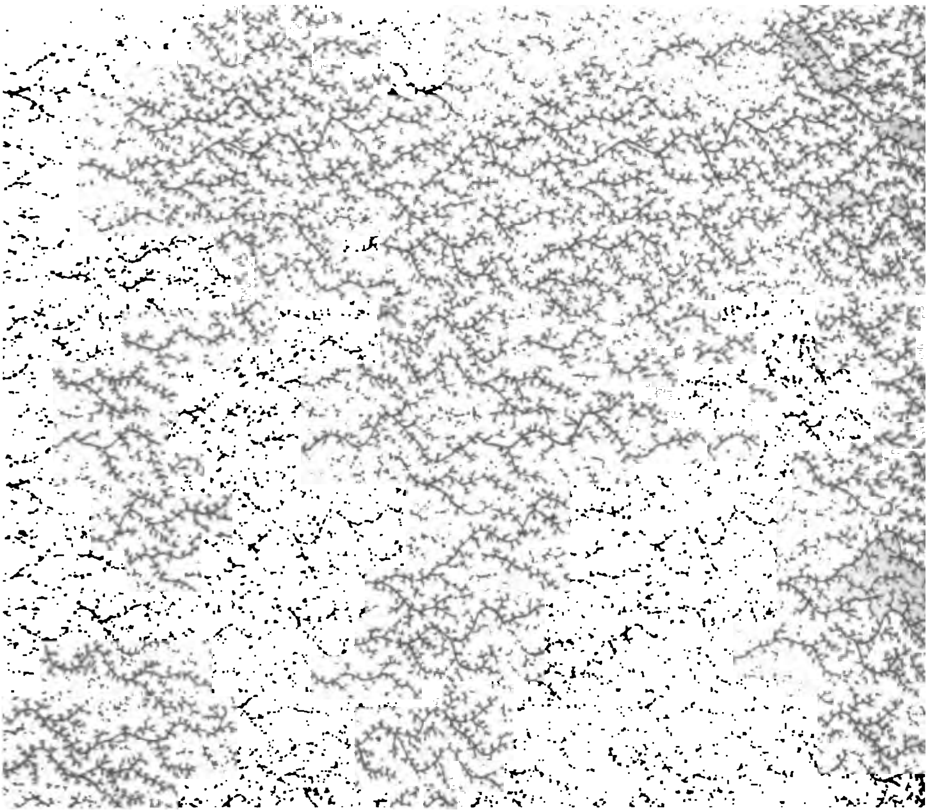

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REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY

1877.

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Report of the Corresponding Secretary.

By the act establishing a State Board of Health for the State of New Jersey, it was made the duty of the board to make report to the Governor, in the month of December, of its investigations and opinions, with such suggestions as it might deem necessary.

The act further specifies, "That the board shall take cognizance of the interests of health and life among the citizens of this State; they shall make sanitary investigations and inquiries in respect to the people, the causes of disease, and especially of epidemics, and the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health; and they shall gather such information in respect to these matters as they may deem proper for diffusion among the people; they shall also make inquiries and reports in reference to diseases affecting animals and the methods of prevention."

In this, our initial report, it seems proper that we should first make reference to some of the considerations which have led to the formation of this board.

The recognition of a need that the State should conserve the welfare of the citizen for his health and for its protection, as well as in other regards, is no new theory.

The idea seems so far to commend itself for an axiom, as to make it an inherent part of the protection of life to which the principles of common law entitle us. Indeed, it has almost been assumed that the law of self-preservation was so emphatic that no one needed to be guarded or instructed as to his own health, and that a trespass on the health of others was such a palpable infringement of personal rights as almost to work its own limitation. Although it was soon found that what ought to be by nature is not by practice, yet legislation was chiefly confined to the sudden invasion of epidemics, and to a dealing with the results rather than the causes of disease.

A higher step was taken when the demand was made that

those who attempted the alleviation of disease, should be certified as to their competency by those of tested skill in their own department of service.

The next step early taken in our own State was an attempt at the securement of such statistics as to births, marriages and deaths as would give information as to the actual condition of the population.

These records, however, were chiefly valued in their bearing on legal questions, as to descent, intermarriage, and inheritance, and thus were only made indirectly available as indicating the numerical and social status of the population.

The thought seems scarcely to have occurred how informing they might become as to great social, economic and preservative life problems.

Later on in our history we find some recognition of the claims of inoculation, vaccination and quarantine as bearing upon the limitation or prevention of epidemic diseases.

So long as disabilities and diseases causing impairment of physical power or death were regarded as only accidental, providential, or unavoidable, there was no room for any State action except to mitigate resultant burdens.

But as soon as it came to be recognized that very many of the causes of impairment of vigor, of disease and of death, are within the range and the duty of human control, so soon it became the interest of the State to inquire into the bearing of legislative precaution on such facts. This all the more because it is but too evident that modern civilization and improvements have introduced so much that is artificial in living, so many conveniences fraught with peril, that we must meet these new exigencies by increasing vigilance and increasing knowledge and by skillful methods of compensation.

Thus facts have been brought into view which have caused such governments as those of England, Germany and France to devote large attention to these matters.

Statesmen and legislators, in defence of the public weal, have been led to investigate the great questions of population and the prevention of disease as a part of the functions of the State. Inquiries instituted under governmental sanction and control have given such astounding evidences of their importance to civic and national welfare, as to eventuate in systematic public

health services for most of the European kingdoms. To statesmen, to scientists, and to professional men in various departments, it is well known how increasingly and potentially the study and abatement of causes tending to deteriorate the public health have commended themselves to national and local administrations.

While the method of governmental concern over any great public interest is always a matter for practical advisement, the need of the weighty consideration of these great interests is so far conceded abroad as to be no longer questioned.

The present Prime Minister of England only expresses an admitted but not realized truth when he says: "The health of the people is really the foundation upon which all true happiness and all true power of a State depends. The health of the people is the first duty of the statesman."

Gladstone, in an article on the Nineteenth Century, specifies the becoming more largely acquainted with the laws of health "as one of the subjects within the sphere of authority, and of conviction and action founded thereupon."

Pauperism and crime, as well as insanity and reform, have to be studied in the relations of state sanitation and legislation; for the prison-house, the asylum and the reformatory attest how closely they touch the public interest. Great questions of jurisprudence are very frequently before our courts in their sanitary and medical regards, in order to determine their legal aspects. Abroad, it is customary to rank all questions of mental invalidity and of medical jurisprudence, as well as very many questions of social science, within the domain of Public Hygiene.

In America, not less definite and decisive is the recognition of the necessity of some action. The various studies and bearings of sanitary protection have been pursued with considerable zeal. Our National Government, in the army and navy, in the District of Columbia, by its laws for the marine service, in its careful study of methods and returns, and in various ways, is showing its effort to conserve the welfare of the people in protection from avoidable perils so far as they come within the sphere of its legislation. States, in their soverign capacity, are not less concerned, and already fourteen of them have State Boards of Health, with powers and entrustments in most cases largely in advance of those of our own.

Many of these have been long enough in existence to show excellent results, and have not only increased in public favor but in legislative consideration. Indeed, it is believed by many that the time has arrived when all our States should have Boards of Health, not with plenary authority, but organized so that our legislators can call for expert opinion upon all questions which in a sanitary way concern the welfare of the citizen. Had such been the case in our own State, we could point to many cases in which losses would have been spared to our treasury from well intended but ill advised expenditures on public buildings, and for charities of various grades.

So far as your board knows, the first general sanitary inquiry in this State, made under legislative direction, was that of 1866.

The Legislature of 1865–6 appointed a State Sanitary Commission, consisting of

J. B. Coleman, Trenton,
R. M. Cooper, Camden,
Thomas Ryerson, Newton,
Isaac A. Nichols, Newark,
Ezra M. Hunt, Metuchen.

It was the duty of the commissioners to furnish to the Governor a report as to "the general sanitary condition of the State and as to the prevention of epidemic and contagious diseases; as to the vaccination of the indigent, the condition of the insane in township and county houses, and all such other facts and particulars with such suggestions and advice as will, in their opinion, conduce to future enlightened action for the promotion of the public health."

A reference to that report will show that the commission was diligent in its inquiries and elicited many facts of importance. Its services were recognized in connection with the cholera of that year, and various points brought to light in that report have had a bearing upon popular opinion and individual conviction since.

From the time of the report made in 1866–7, to 1873 there was no investigating legislation in respect to the public health.

It was believed that greater intelligence and conviction was needed as to the dependency of much of ill health, disease and death on preventable causes. As facts in these regards were being accumulated, both in this and in foreign countries, and as

our needs were becoming more apparent, not only to physicians, but to others whose calling and observations led to inquiry in this direction, it was better to abide the time when an improved public opinion or a better appreciation on the part of our governing authorities should favor further investigation; accordingly, it was not until the winter of 1873–4 that the Legislature passed an act for a commission which was to all intents a Board of Health, but whose services were limited to a single year.

This commission consisted of

James R. Mercier, of Jersey City,
Hon. Samuel Lilly, of Lambertville,
Prof. Geo. H. Cook, of New Brunswick,
William Elmer, of Trenton,
Lewis W. Oakley, of Elizabeth,
Ezra M. Hunt, of Metuchen.

This commission instituted extended and systematic inquiry through various portions of our State. It was furnished with abundant evidence that we are not exempt from most unsanitary conditions which obtain in other States, and that we have the same need of thorough attention to methods for protecting the people from the avoidable causes of disease and death. Indeed some of our rural districts were found to be suffering to an exceptional extent with identified and indisputable sources of sickness, while even some of our larger cities revealed a degree of inattention to civic sanitation which did not admit of defence before those at all familiar with recognized and established principles of hygiene.

The report condensed some of the more important information derived from good authorities in divers localities in our State. These showed how fevers, lung diseases, miasmata, were directly traceable to their causes.

Questions as to water supply and sewerage, as to tenement population, arts and trades, as to schools, as to ventilation and heating, as to protection from adulterated and improper foods, as to the health condition of animals, and as to vital statistics, were carefully discussed in the view of accumulated facts.

The report made by the board became the property of the State, and by its circulation both in pamphlet form and through the press, aided much in the dissemination of health-saving knowledge among the people.

As one of the results, a sanitary convention was held in October, 1875, for the purpose of considering the best means for promoting and preserving the health of the towns and cities of the State, and for consultation as to the means to be adopted to prevent the occurrence or spread of disease.

The association has ever since commanded the attention of many of our most prominent citizens, and has perseveringly revealed how much can be done intelligently and effectually to protect our people from very many of those prevalent causes of disease which are an incubus on capital and labor, not less than upon the individual sufferers.

In the winter of 1876–7, your honorable Legislature saw fit to follow the course of many other States, in the appointment of a State Board of Health, to whom should be committed the duty of inquiry and suggestion as to those matters of public interest, which would naturally fall within the scope of their investigation. The Governor had been among those long recognizing the need of some such Health Board, and having given the law his sanction May 22d, 1877, appointed the following persons together with the Secretary of State, and the Attorney-General, who are members *ex-officio*, to constitute said board:

Ezra R. Osborne, C. E., for one year,
Elias J. Marsh, two years,
Laban Dennis, three years,
Prof. Cyrus Brackett, four years,
James M. Ridge, five years,
Theodore R. Varick, six years,
Ezra M. Hunt, seven years,
Hon. H. C. Kelsey, Secretary of State *ex-officio*,
Hon. John P. Stockton, Attorney General, *ex-officio*.

A copy of the law will be found as an appendix to this report.

The board was first called together by Governor Bedle for organization May 22d, 1877, and His Excellency invited to sit with it at its opening meeting.

Ezra M. Hunt was appointed chairman pro tem., and by invitation of the board, addressed it as follows:

Gentlemen :

As we are about to organize into a State Board of Health it may be opportune for me to say something of the antecedents,

which have led to the action of the Legislature, by which this board has been constituted, and of the occasion there is for some such organization in the State.

While there has always been on the part of enlightened nations some attention to matters involving the health of the citizen, as a rule it was anciently confined to alarming epidemics or to those obtrusive nuisances which forced themselves by manifold odors upon public attention. With the progress of medical science, of engineering, of the various physical sciences and of free school education, some of our lawmakers have come to realize that the laws of cause and effect are as definite in the domain of invalidity as they are in the relations which result in good health and normal endurance. When this is manifested in the actual seizures of disease it finds a direct relation to the art of the medical practitioner. But so soon as it becomes apparent that a large ratio of the inflictions of sickness is preventable, so soon there is a domain outside the business relations of a profession which concerns the citizen and the commonwealth.

The geologist feels it not foreign to his work to inquire what telluric conditions affect the physical condition of those who dwell upon the soil. The meteorologist is quite willing to take into consideration the bearings of heat, moisture and all atmospheric conditions upon animal health and life. The Entomologist, knowing that over fifty diseases are owing to parasites and that germs are shown to be somehow connected with many diseases, quite naturally contributes his quota in the study of insect life.

The chemist readily recognizes the relation of his art to the detection of unfriendly substances in food and air and water. The physicist in all his departments knows that manifold facts under his cognizance need his aid and demonstrations to show their practical bearings upon the conditions of physical existence. The architect and engineer readily see how the structures of habitations above ground or the preparation for them and for the removal of household debris require their aid. The physician, as dealing most directly with the human body, of course in the line of his calling, is brought in direct contact with the conditions and circumstances which favor ill health. But if intelligent as to sanitary matters he rapidly recognizes that here is a field in which the workers and the appliances are not exclu-

sively professional, but are such as to command the attention of those of various occupations and are deserving of the study of society at large. We thus meet on common ground, each desiring to bring all that his individual domain may afford. Although thus employing many factors, sanitary science is itself a distinct department. As such, in the University of Edinburg, for instance, it has its place for a degree in science, not as a department of one of the liberal professions but alongside of (*a*) physical and natural science; (*b*) engineering; (*c*) mental philosphy; (*d*) philology.

In this and many other ways has the science of public health come to be authenticated. Every science has its art. The art of this science is the art of preserving health It is not difficult at once to see that if there is such an art with a science behind it, it has great bearings upon political economy and is a weighty legislative concern.

There is no need of argument to show that sickness is one of the greatest of all burdens upon national prosperity. That which is the most prevalent discomfort of households and individuals, if preventable, cannot escape the care of the statesman. Indeed the welfare of the State is largely dependent upon the health of its inhabitants. It is not only a comfortable but a material interest. It makes a wide difference to us politically whether the death rate is 16 per thousand as in Massachusetts or 40 per thousand as in some of our cities.

It is a matter of civic import if, under a lax law there are, during a period of fifty years, 35 out of every 1,000 deaths by small pox, while in another country equally exposed, by reason of more stringent preventive acts, there are only 7 to a thousand. 388,340 deaths by scarlet fever in twenty years in England, is an item for political economy to consider, if a large per centage of these is avoidable.

Every death, too, represents very many other cases of sickness and suspended labor, and causes expenditure of labor by others, a large portion of which is not of a profitable kind. Epidemics sometimes make themselves so felt, that besides the home mournings the city is appalled at its business depletion. But more potent than these are the silent forces of lung, bowel and brain affections, which, like the small musketry of batta-

ons, disturb, decimate and despond society more than the occa-onal cannonade.

Dr. Farr has made a calculation, based on a decade or more of ccurate statistics in a district of England, to show the value of ealthy men and women and of an average life in a commercial spect, and so has reckoned the enormous deficit made by pre-entable sickness.

Apparent as are such facts, so long as methods of prevention ere unrecognized or the dependency of disease upon ascertain-ble and abatable forces only mildly affirmed, the time had not ome for the exercise of any general system of limitation or pression on the part of governments. When the plague, or holera, or yellow fever came, the only activity of government ould be in limiting its results by caring for its victims and in ding the flight of those who could escape. The observation at some such diseases arrived like foreigners led to quaran-nes, but even these were often so defective as to make a nidus r pest.

But amid the modern studies of disease which have been aided y physical science and directed by new methods of classified bservation, series of facts have been elicited, which show that an is an animal with laws of development and preservation as efinite as those which obtain in any other sphere of nature. While there are limitations to existence within certain defined mits, there are laws of preservation, of protection, and of de-verance from many maladies. These are not casual but pre-ise. Nay, more, the contagions themselves admit of limitation, nd the duration and validity of a life is, by the ordering of a ind Providence, very directly in the keeping of the individual nd of society as organized in the State.

I need only very briefly to allude to a few of these by way of lustration:

Small pox, once the scourge of nations, and still, by reason of manifold neglects, resident in every State, is so preventable that nder a stringent law Ireland had in one year but three deaths herefrom.

Typhoid fever is so directly the result of a specific poison, that we have come to know very many of the conditions of its incu-bation, and proper surface and underground sanitation will argely abate it.

The various bowel diseases which, especially in our own country, destroys so many thousands of infant population, have very ascertainable relations to bad dwellings, bad water, bad drainage and interference with proper temperature and ventilation.

A large class of seizures, such as diphtheria, scarlet fever, measles, etc., are recognized as dependent for their virulency upon avoidable local conditions, which can be largely remedied.

Miasmatic diseases, which in this and other States are a great tax upon labor, have much to do with undrained lands and injudicious exposures, and so have many causes within the reach of hygiene.

Consumption and other lung affections have in late years been shown to have much to do with soil moisture and with atmospheric conditions, which can be guarded against easier than the actual disease can be cured.

Besides all these, there are constitutional and hereditary diseases the means of limiting or eradicating which are within the reach of preventive art, so that malformation, insanity, etc., come within the perview of interruption.

We refer to these as but a few examples of the large area to which sanitation relates.

Even independent of these, one department of health and life has long been recognized as worthy of registry by the State. As the design of a census is not merely to flatter a pride of progress, but to acquaint a people with the condition, employments and extent of its population, to inform as to military or defensive ability, and to indicate the direction and conditions of development, it was rightly considered that births, marriages and deaths are important items in such information. Accordingly statistics have been secured in their merely numerical bearings.

But the study of all census returns has made rapid advance in the last few years. Prof. Francis A. Walker, as Superintendent of the ninth United States Census, gave special prominence to the importance of such returns, and in common with similar officers in other countries, has shown that in more senses than one they are vital statistics. In cities their value is now so practical that they are used as the direct indications for holding in check the evil communication of preventable epidemics, while

the facts obtained over large areas of territory are being studied with satisfactory results by registrating statisticians.

All these and many like facts make it apparent that the time has come when definite methods can be put in operation for guarding and conserving those interests which touch the citizen in that which is his most vital and inalienable right—protection from the avoidable causes of disease or death.

Moved by such considerations, England has now its Government Board, which extends its sanitary supervision to the whole kingdom. The statistics of the Registrar General are often so definite as to enable the government to put out signals of disease as veritable as those relating to approaching storms. It used to be thought by some that the country at large did not need any legislation in this direction, as diseases found their chief carnival in crowded populations. But the country has its special local impairments as definite as those of the city. The imperfect drainage, the damp cellars and contaminated wells of the one quite parallel the sewers, basements and befouled waters of the other. The study of the causes of disease can often be more technically made in sparse populations than amid crowded localities. So true is this that Sir Wm. Jenner, of London, in a recent discussion of the views of Murchison, as to the origin of typhoid fever, has said (1875) the only way of settling the question is " to thoroughly scrutinize every isolated case that occurs in out of the way country places."

In fact the diseases of the city often arise from the country, and vice versa. The severe outbreak of typhoid fever in Leeds, 1873; that at Marylebone, London, and the one in Glasgow, arrived from dairy farms several miles in the country, and water and other contaminations do not always occur at the place of outflow and delivery. Again, it is only by studies over large areas that we can estimate coincidences and account for differences and so arrive at the laws of disease-productivity. Facts in one locality or in one class of population are often misleading, while comparisons and contrasts are most informing. Indeed, among sanitarians, the question of the necessity of territorial observation is no longer discussed.

Satisfactory observations in these regards can not be accomplished without the aid of law. The spontaneity of the individual does not lead him to guard against the ascertained sources

of ill health. Even if circumspect and informed himself, he can not apply the facts to the case of his neighbor. Yet in no other line is the mistake or carelessness of the neighbor so apt to tell upon the adjacent household. Many of the evils are of that nature that they attach to no one vicinage, but are such as relate to an entire street or water course, or section, or to some great highway of conveyance, and must have legal regulation. Much, too, of the value of law in these regards is that it is informatory and educational, far more than it needs to be compulsory. The reports of the English Health Board for the last twenty years have by the diffusion of intelligence done far more for the benefit of public health than have any penal enforcements to which they have given rise.

Large and telling facts have been elucidated, and the press has been engaged until sanitary papers are as common in the London Times as the reports of educational or literary associations. One is even surprised at the intelligent lay discussions found in numerous journals as to local and general health interests. The necessity of law thus comes to be recognized so that what otherwise might be regarded as a trespass upon private rights is welcomed as an offshoot of that olive branch of protection which extends peace from pain and deliverance from death, and so gives to the citizen ease instead of disease.

Law, to say the least, is bland and beneficent and conservative when, in such a noble work, it is no more aggressive than that under which this board is organized. It has asked no attribution of power and seeks no jurisdiction such as that which often needs to be conferred on local boards. Its sphere is to collect and present each year the best ascertained evidence there is as to preventable causes of disease, as to the effects of localities, employment, conditions and circumstances on the public health, and to diffuse it in such practical form among the people as shall add to popular information in these regards.

It will be necessary for us to inform ourselves as to any local causes of disease or as to the course and circumstances attending any epidemics that may invade our State, and by correspondence and observation to seek to assure ourselves of the connection of any existing or abatable evils with such sickness or mortality as may occur. In this we will, no doubt, at times need to invoke the aid of local authorities, and especially the aid of those

who, as medical practitioners, are most observent of the state of public health.

Our experience has been that some of our most reliable physicians, as well as various laymen, such as teachers, druggists, chemists, engineers, et cetera, are responsive to such requests. We think we shall not fail in the securement of a valuable amount of reliable facts and careful opinions.

It will also be well for us to look carefully at all existing laws bearing on public health and after all those defects in legislation which might be supplied without infringement on any individual rights and to the advantage of all. As such suggestions would come before the legislative and executive branches of our State, they would have only that force of advocacy to which clear facts and open arguments might entitle them, and are in no danger of being prematurely enforced.

It will naturally be our aim to seek the aid and co-operation of all local boards, not so much expecting to enlighten them as that they, in the common interests of sanitary knowledge, shall acquaint us with all local facts bearing on health interests, and so enable us, by the collection and presentation of the records of various localities, to render available to our citizens at large the information which cannot be equally serviceable in any other way. A misapprehension of the design of such boards led to a clause in this bill which was intended to restrain its jurisdiction over cities or local boards of health. It is already understood by most of the city boards that no jurisdiction is aimed at or provided, and that, in order to an intelligent presentation of the interests of the other districts, a knowledge of local and aggregated population is needed. We doubt not, with the urbanity of citizens and the devotion of local sanitarians, they will unite with us in conserving interests so far removed from partisanship and so vital to the people of the State at large. It is chiefly by the co-operation of local authorities and of those whose professions and fields of observation direct their attention to health matters, that we are to hope to render most effective co-operation for the physical welfare of the people.

Very many subjects will readily suggest themselves to the members of our board, and it will require much thought so to outline and conduct our work, both of investigation and of imparting information, as to lead the people and our rulers to in-

telligent conviction of what is needed, and to such action as shall be spontaneous and acceptable.

For several years many of our most thoughtful citizens have realized that there was call for a more extended presentation of the interests of public health. Our relations as the great highway to, and as the suburbs of, large cities makes us especially exposed to epidemics, without the protection which great cities are apt to provide. Nuisances expelled outside of city limits are sometimes thrust upon us, which have, in many cases, led to serious results. Our able State Geologist and others have set forth the evils caused by drowned lands, and the advantages to be had in some parts by improved water supply. Statistical defects have been to some degree recognized, and cities like Newark and Paterson have perfected methods of their own.

Our board commences its labors at a most opportune time. In our own country and abroad for the last two years there has been an unusual awakening to the interests of public hygiene, and to the necessity of the fostering care of the State therefor.

There is a large accumulation of facts and of principles to govern us in our work, and a literature rich in illustration and evidence of the practicability of sanitary administration.

I may thus, while declining to be other than your temporary chairman, be permitted to express the congratulations of each one to the other that it is our privilege to labor together in a field in which there is more of usefulness than of reward and more of labor than of honor.

The best acknowledgment we can make to the honorable Legislature which has passed this law, and to his Excellency the Governor, who has honored us by associating us in this work with members of his staff, is to faithfully detect and expose the evils which burden the public health, and impart such information as shall guard against avoidable invalidity. So in our sphere, by contributing to the welfare of our fellow citizens, we may seek to honor God in serving mankind. With these remarks, I beg to announce that the board is organized sufficiently to proceed to business.

The board was then permanently organized by the appointment of Elias J. Marsh, M. D., as President; Ezra M. Hunt, M.

D., as Corresponding Secretary, and E. A. Osborne, C. E., as Recording Clerk.

The board proceeded to a consideration of those subjects which most urgently seemed to call for their attention.

As only about six months would elapse before the first report is required to be rendered, it was thought best to study and outline the work to be done, rather than enter at once upon an extended series of investigations.

The following subjects were chosen and committees appointed to make thereupon preliminary reports:

On registry of Births, Marriages and Deaths—Messrs. Kelsey, Marsh and Bodine.

On the duty the State owes to children as to their protection from impairment of health in the Home, at the School and in the Workshop—Messrs. Hunt, Dennis and Brackett.

A brief summary of directions to families as to the more common domiciliary influences and surroundings productive of disease, and the means of detecting, neutralizing or preventing the same—Messrs. Ridge, Osborne, Taylor and Marcy.

A brief statement of endemics or epidemics that have occurred since 1870 in the State, and their causes, so far as ascertained—Messrs. Varick, Culver and Gauntt.

A brief paper of information which shall point out such localities in the State, as from their topographical and geological position and condition, stand in special need of sanitary improvement—Prof. George H. Cook.

A statement of the climatology at various points in our State for five years past, and of diseases apparently dependent thereupon—Messrs. Brackett, Osborne and Dennis.

The diseases of animals, although not placed in charge of a committee, were directed to be inquired into by various members, and the Corresponding Secretary directed to collect information as to any epidemics that had occurred within the last five years, as preparative to further investigations.

The secretary was also directed to secure a codification of all laws bearing upon or relating to State hygiene, which are to be found on our statute book, and to furnish a list of the same to facilitate reference. The papers which have been prepared by these several committees, will be found to be a valuable part of this report.

Many other matters of sanitary interest have come before the board at its various meetings, but it is not thought necessary to report to your excellency, details, except so far as they relate to the present outlining or execution of work.

VITAL STATISTICS

The first subject to which your attention is invited is that presented in the paper on vital statistics.

It has not been considered by the committee necessary to reason in detail the necessity which exists for a careful registry and return of the births, marriages and deaths in every State and city. Our State was among the first to settle that question by a definite effort in that direction. The improvements made in the methods of studying and tabulating such records, the greater knowledge of the course and causes of disease, the results attained from the systems already adopted in many countries, the necessities of such tables for the study of the laws of population and of life insurance, and the ability which has been shown to limit epidemics, to prolong life, to prevent outbreaks of contagions, and even to abate crime, by the study of these vital tables, has undeniably attested their indispensable importance. As they indicate the rise and ebb of population, the laws which govern it, and the best legislative methods of conserving the interests of the citizen, these results are sought by the political economist, not less than by those who seek to know the science and the art of preserving life. All arguments which obtain for the procurement of any census returns, apply with more force to these than to any other, because they embody more of the objects of a census than any other class of statistics. Our error as a State has not been in entire neglect, but in a failure to change and improve the law, and to bring it in accord with more modern and perfected systems of return. Our present law is not only that of 30 years ago, but even that is mostly a copy of the original law of the eighteenth century. Since then such has been the increase of knowledge as to the interest and significance of statistics, that present methods have become impracticable and misleading.

The chairman of the committee herewith presents his report and advisement as to desirable changes. The New Jersey State

Sanitary Association has also had two papers before it, in which the subject has been well examined, and other facts adduced to which reference may be had. The State Board of Health is carefully considering the whole subject, and will necessarily recommend some change in the present inoperative law.

The report on the duty which the States owes to children in families, schools and workshops, will this year deal only with the home and the school, reserving the relations of the State to children in factories for another year. This report recognizes the child as, to no small degree, the ward of the State; since from five to eighteen years, he is taken under the charge of the State for education. It is all important as a great public and social interest, that we should avail ourselves of such information as to methods and surroundings as will fully carry out the object of free school training. This report seeks to present some of the various evils to which the child is exposed, in order that the attention of parents and citizens may be directed thereto for their abatement. Some of the more important means by which improvements are to be effected are stated. Also some of the readier tests are given by which unsanitary conditions of air, water, heat, etc., may be detected. The whole subject is one of such vital interest to the growing population of the State, that it will commend itself to your careful thought and inquiry.

The report as to the "More common domiciliary influences and surroundings productive of disease," does not attempt to consider all household conditions hazardous to health, but in this, the first report, fastens attention on the evils of defective ventilation and impure water supply, as introductory to a fuller consideration of methods of improvement and of other sources of ill-health which are very apt to occur in household administration, and especially in the close vicinage of cities. It deals with subjects of practical interest to all that dwell in ceiled houses, and thus addresses itself to the consideration of every citizen.

The report on endemic and epidemic diseases in this State since May, 1869, is a summary of all the best information that can be obtained upon the subject. In the absence of any State Board of Health, or of any reliable system of vital statistics, the only dependence has necessarily been upon the reports of medical societies. These are of great value so far as they go, but as

in all purely medical reports more attention is given to the detail of symptoms, to the ways in which separate organs are affected, and to the methods of treatment, than to causes and the methods of prevention. It was, however, thought best by the board to collect all information possible as to endemics and epidemics for the last septennary period. This is introductory to that more strictly sanitary study of causes, of surroundings, of the laws of infection and contagion, which is so important in order to ascertain the most feasible methods of prevention or limitation. The details here given have, therefore, interest for future comparisons, and as points of departure for systematic sanitary analysis. It will be found in the report that soil moisture or imperfect drainage is well recognized as causing fevers and other diseases of an intermittent or miasmatic type. The malignant malarial fever localized in a certain suburb of Trenton in 1871, is instructive as showing how a miasmatic influence may be so intensified as to produce a type of the fever almost as pernicious as the yellow fever of the tropics.

The decline of intermittent and remittent fevers in Camden and its vicinity, as the result of effectual drainage, has been so marked as to corroborate manifold experiences of the same kind in other States.

The report discusses the sanitary effect of salt marshes, and the subject is one needing further inquiry. It will be seen that this report does not deal with developmental diseases, or those dependent on imperfect nutrition, but chiefly with zymotic diseases. These usually depend upon outside contagions rendered active by unhealthy surroundings, and by the susceptibility of the persons affected, both of which we believe can be greatly modified. It will be noticed that the chief endemics or communicable diseases confined to some one locality have been typhus fever in 1870 in Jersey City, and one each of cerebro-spinal meningitis, puerperal fever and erysipelas Typhoid fever while endemic mostly, has at times almost seemed an epidemic.

Epidemics of measles, mumps, whooping cough and influenza have from time to time occurred. But the three prominent pestilences in the State for the period since 1870 have been diphtheria, small-pox and scarlet fever. Diphtheria has been epidemic in at least twelve counties of the State in a single year (1876), and has at other times prevailed more or less in various

localities. It is as much under the control of preventive and sanitary as it is of purely medicinal treatment.

Small-pox, in the same period, has numbered as many as one thousand cases in a single year in one city. Most of our larger cities on lines of public travel have had it prevalent or epidemic at various times. In Camden it preceded the fearful scourge of Philadelphia in 1872. A mortality of 37 per cent. among those not vaccinated is stated. It is a disease often met with in country localities, as well as in larger cities. A distinguished writer, who is not a theologian, has said that the perversity of mankind in neglecting vaccination, which is so sure a protection against fatal attack, is the most available argument in proof of original sin. Now that vaccination directly from the calf can always be secured, the old excuse of the possibility of catching skin diseases from other people's children, which has been greatly magnified, has to be laid aside. Our State is so much a highway of travel that it is greatly important that all proper means be used to secure the vaccination of adults when the epidemic prevails. The contrast between such cities as Providence on the one hand, and Philadelphia on the other, shows what a difference in the prevalence of the disease can be made by an efficient system of vaccination. It seems to us, it is one of the rights of the citizen to be protected from such exposure. When, as in our State, the child has the gratuity of the free school, it is scarcely a question but that his vaccination should have been attended to before he is placed in a position by which he may unnecessarily become the conveyer of a disease which jeopardizes the rights of all the rest of the school.

Scarlet fever, which is so often epidemic in different parts of the State, is greatly influenced as to its spread and malignity by hygienic conditions, and is, therefore, very much under the control of sanitary jurisdiction.

In reference to this and all other diseases known as zymotic, the bearings of the pollution of air, of water and of habitations and of personal cleanliness thereupon is so definite that our highest authorities agree in calling them filth diseases; not that they may not occur amid good sanitary conditions, but if so, it is because they have been warmed and nurtured into virulency amid favoring circumstances. Even where these diseases occur, we greatly modify them by well applied hygiene. It is

maintained, too, by some of us that in the case of persons exposed to these contagions, much is to be done by their preventive treatment in advance of the time for the manifestation of any symptoms.

The paper on miasmatic diseases in Hudson county clearly presents the atmospheric and telluric influences in the county, which seem to favor the prevalence of intermittent and remittent fevers and to give to other diseases a miasmatic type. While all of us may not attribute the result so entirely to the extreme moisture, yet this is no doubt one of the factors in the causation of miasmatic disease. The views presented will aid in the study of that large class of disease which has its origin outside of the body, and which therefore is to be searched for with eagerness, either that it may be abated or that exposure thereto may be avoided.

The board also requested from Prof. Geo. H. Cook, the State Geologist, a brief statement as to any extended localities in which geological structure or surface conformation gives rise to imperfect drainage, or to any other circumstances which might jeopardize the health of the individual.

The study of the earth's surface, both as to its topography and its geological structure, is telling us much as to the conditions which favor heat or cold, moisture or dryness or sudden changes that may take place both in telluric and atmospheric conditions. Great water basins dependent upon impervious rock below the surface, while the crust of covering soil seems high and dry, sometimes account for intermittents in localities apparently free from miasmatic causes. Minerals in the water or the soil and the character of vegetation have much to do with normal or abnormal decomposition and decay. Water supply for drinking purposes is greatly involved in questions as to clayey, gravelly or humus soil. So, very many other questions as to health, require a knowledge of the earth's structure. The study in this State is all the more inviting because faithful and able service has so well defined its geological structure, and because the great geologic formations are so distinct. Perhaps in no State of our Union is there such encouragement to the study of population as affected by location. The triassic or red sandstone formation occupies nearly the whole of 9 or 10 counties. The cretaceous formation, including the green sand marl beds,

has its long and narrow belt adjoining, giving character to consecutive parts of eight counties more. The tertiary or more recent formations of Southern New Jersey cover six counties and parts of four others. Thus, in all but a small portion of the State, geologic structure can be studied in its bearings on air and water, moisture, disease, et cetera, without the complications which occur from frequent overlappings and intersections. The azoic and paleozoic or primitive formations, including the iron ore and limestone districts, in the northwest portion of the State, intermingle, but the other three formations already noted "are so entirely distinct from one another that they can easily be drawn in separate maps." Our geology, our locality, our minglings of city and country, our distinct sea and mountain districts and all as related to disease and climatology, so invite attention and investigation, that an eminent American sanitarian recently said to us that he considered New Jersey as the best locality in our Union in which to study those sanitary problems which most concern the civic welfare of the American people.

This year as preliminary we have only asked such indication of localities especially needing attention as have been brought to notice in the course of former surveys. We commend this paper to the notice of all interested in questions of drainage and public health, as indicating an important State interest.

Akin to this will be found a report upon the climatology of a part of the State for the last five years, as will be needed for reference when we come to secure future records, and to associate them with reliable statistics as to the progress of disease, and the ratio it holds to heat, moisture and to telluric and atmospheric conditions.

In this report it was not found feasible to make such comparisons, as so few even of our cities have attempted mortuary tables, and as other essential factors are absent, so that the data are insufficient in details and in extent of observation.

It had been the intention of the board to have furnished a careful statement of the diseases of animals for the last five years in this State, in order to show those to which experience had indicated us as most exposed, and for the purpose of pointing out methods of isolation, precaution or prevention. As there have been only sporadic cases of such diseases, as no one seems to have tabulated with accuracy the number of cases, and as the exact

diagnosis of the disease is seldom verified by skilled veterinarians, it was found that such information would have in it little if any practical instruction. It is our hope to secure, from the very few educated veterinarians and from the leading stock proprietors in our State, such facts as shall hereafter enable us to give intelligent notice of this branch of health interest. It is well for our citizens to know that the diseases of animals and their modes of prevention are being carefully studied in all European countries and in our own, as a part of sanitary science, and that veterinary practice is securing to itself exactness of diagnosis and of treatment quite in keeping with the progress of medical knowledge. Animals in our own country suffer greatly from a kind of promiscuous prescribing, little better than guess work, and diseases are spread or fostered which might easily be limited. It is important that the people generally should recognize the health of animals as essential to the productive energies of the State, and to the food material of its inhabitants, and also that many of the laws as to food, ventilation, isolation from contagion, and cleanliness are applicable to them as well as to the higher animal, for whose comfort and sustenance they are provided.

CORRESPONDENCE OF THE BOARD.

The board has initiated correspondence with boards of other States, and is availing itself of the best information it can obtain, as to the more pressing and vital interests of sanitary improvement. It has also been invited to some foreign correspondence, and has answered inquiries presented to it from abroad in reference to the great interests of public sanitation.

In our own State the board, by a circular issued in June last, placed itself in correspondence with persons in various parts of the State, who were believed to be best informed as to local impairments and needs, relating to health. A special circular was also addressed to city boards, so that we might obtain from them such information as would aid in our general work. It appeared that some of our cities had no organized boards of health, and in others they were acknowledged to be inoperative by reason of lack of interest, of information or of defined authority. From most of the cities which have boards of health, we received

kind and co-operative response. The board has not yet entered upon a plan of systematic and tabulated inquiry as to diseases and their causes, as the work preparatory to this is more important just now, and needs to be well conceived in order, in due season, to be well executed.

The labors of the commission of 1874 and the two reports of the New Jersey Sanitary Association accessible to us, together with some reports and other documents of State and county medical societies have enabled us to form such estimate of the work to be accomplished as to make it unnecessary to repeat such preliminary work until local boards are more fully organized, or sources of error which now jeopardize responses to inquiries and inaccuracies which admit of remedy are more carefully guarded.

Soon after the first meeting of our board we were addressed in reference to a nuisance, which had arisen in one of the villages of the State from the accumulation of large quantities of milk in vats. A factory for the condensing of milk had been established, and after running for some time and accumulating a large amount of unused material, the business failed. About 5,000 gallons of milk were left on hand at a season of the year in which it soon underwent fermentive and putrefactive change. The proprietors secured a number of hogs in order to dispose of the material. This, while gradually diminishing the quantity, did not abate the nuisance. The stirring and mixing of the mass, in order for its disposal, really increased the evil. The corresponding secretary, after apprising himself as to the facts, presented the merits of the case to the chief proprietor, who seemed not to have realized the unsanitary character of the nuisance. Although this did not lead to as speedy relief as could be desired, it hastened the efforts to remove the offense. By appointment of the board, a committee then visited the place and gathered from the nearest physician and others such facts as were relevant. The evidence afforded to the committee, not only of the reality of the nuisance as afflictive to the senses, but also as detrimental to health, was convincing. One lady had suffered a serious illness which had necessitated her removal, and which was certified by an intelligent physician as caused by the spoiled milk and the pens. Others in the neighborhood had suffered from consequent diarrhœa and from that feeling of dis-

comfort which often occurs from impure air charged with organic matters, even when there is no pestilential outbreak. We think the citizens of that town are to be congratulated that serious consequences were so limited. Said one of the proprietors to us, "I never could have believed that milk curd could smell worse than carrion." This filthy mass, decomposing under a summer sun and filled with maggots of various proportions, found its way into hogs, which were killed in September and sold for pork of doubtful salubrity. The proprietors had no evil intent, but by a want of apprehension of the risks to health, and from anxiety to save further monetary loss, they jeopardized the interests of others. It was an illustration of that class of cases liable to occur anywhere, in which some local authority should have power to adjudge a nuisance and to cause its abatement, if so immediately prejudicial to public health as to require summary attention. Such a case as this cannot be met by the usual grand jury presentation, as there is no sitting during the summer solstice, when such exposures and when epidemics are most likely to occur. Authority for the summary abatement of threatening sources of disease in cases of actual and present peril admits of safeguards, and is not more likely to invade personal rights than any other kind of authority conferred in the interests of the common rights of society. It is often the misfortune of defective sanitary legislation that even epidemics are permitted to get headway, when a right exercise of conferred authority at the right time would have limited the contagion. The last outbreak of yellow fever at Memphis was a signal instance. In our own State we once saw a thickly populated village subjected to cholera contagion, and the township authorities appealed to in vain, not because of want of interest, but of want of jurisdiction. We have reason to believe in that case a serious outbreak was only prevented by the courage of a physician who, in his own name, took possession of soiled garments and beds and burned them.

It has generally been the misfortune of liberal governments that they leave legislation to deal with accumulated and direful results, rather than with the abatement of causes. Thus the severity of the law which afflicts or punishes, supersedes the blandness of the law which prevents. This milk nuisance to which we have alluded, occurring in a retired and unexposed village, is an illustration of how easily or how undesignedly an

evil may spring up in localities least anticipated, which can be met by proper and well defined statutory limitations, and also of how much need there is of the diffusion of such intelligence as will lead to the entire prevention or speedy abatement of such nuisances.

WATER SUPPLY.

The Board of Health has been appealed to in the case of the interruption of a water course in Warren county, by which, it is alleged, the water of a town is deteriorated and sickness results. We have not as yet been able fully to investigate the facts, but have placed them in the hands of a competent engineer for inquiry. If it is found that there is real peril to health, we shall hope to be able to persuade those concerned to furnish such means of restoration as may be indicated.

The whole subject of the water courses of our State, both as relates to their availability for the furnishing of pure water, or as open sewers or carriers of the pollution of cities, is one well worthy of the careful attention of our citizens. Our cities and our densest population is distributed along water courses, under modifications arising from the proximity of New York and Philadelphia. Tide water and great tracts of salt marshes in the north, and the sand deposits of the south, introduce other correlative factors. The questions of water supply and sewage and river contaminations must be studied in view of the great present and prospective massing of populations on the red sandstone and cretaceous tract and adjacent to great alluvial deposits. Some of these problems, as is well known along the course of the Passaic, have become complicated already. Others can be much more readily and economically solved by being comprehended now, before greater obstructions and increasing disabilities embarrass the solution. It is our hope in another year to discuss more fully the whole subject of water supply, both as it relates to cities and to country districts. We thus allude to it here because we would have our citizens on the alert beforehand in inquiry as to the vital range and critical significance of its wise consideration.

ODOR FACTORIES.

Our attention has also been drawn to the proximity of offensive factories, slaughter houses and dumpings, and collections of filth to which a portion of our State, by its position, is much exposed. At one point from 12,000 to 18,000 hogs are often killed weekly, and besides large quantities of offal are brought from another point to this, for rendering. Factories for dealing with refuse material send abroad their noxious ordors over the wide plains between the Passaic river and Jersey City, and it cannot be denied that the air in summer, and sometimes in winter, is so charged with organic matters as to render it intensely offensive. The refuse of cities is in some cases so gathered upon the outskirts, as to cause present nuisance, which will be rendered permanent and scarcely less hazardous when it comes to furnish the building ground for future dwelling houses.

On some accounts it is not necessary to discuss the question whether bad odors are necessarily harmful. In other countries, law has already decided that smells which inflict discomfort upon society at large, and odorless smoke when poured in such volumes into direct contact with populations as to be afflictive, if it can be remedied, must be on the general principle that whatever unnecessarily and intrusively interferes with the public comfort of large masses, may become a subject for legal enactment. Gladstone has specified poor water, foul air and smoke, as the three prominent nuisances of cities.

It would seem, as thousands are necessarily brought each day within the tainted and offensive air of many of these establishments, that at least the greatest effort should be made to prevent these sickening smells. An eloquent lawyer of our own State recently, in glowing language, described to us the personal infliction to him and to very many whose complaints he had heard, and his sense of mortification that the multitudes passing to and fro through our State, should be subjected to such annoyance. A prominent railroad official who has for long years studied the effect of scenery, of bridges and tunnels, of foul air, and of various conditions and circumstances of travel on the choice of routes, and the comfort and satisfaction of passengers, avers that these matters much concern the inclination of people to tarry in a State, as well as the interest of a company as carriers. In these

instances, the usual argument that those who object should not move to the vicinity, cannot apply, for the roads were in possession before the nuisances, and, besides, the fair presumption is that land near cities must be occupied for human habitations as well.

But the chief point for us is to know how far these bad odors are injurious to health, and so to seek their abatement if indicated on this ground.

While it may not be possible to analyze each individual stench, or to assert that each and every unpleasant odor is harmful to health, yet the general fact remains undisputed that all gases of decay are contaminations of pure air and were not intended for breathing purposes. They give rise to general malaise or to deterioration of vital force. Depression of vigor occurs to some, others have only disbursing mental impressions, which make reasonable discomfort, while the weaker or more susceptible suffer from direct disorder of vital functions. It is not necessary to show that many are permanently injured, but if some have vital impairment for a time, if to others they are the exciting cause of sickness, and if occasionally they prove the fertile hatching-place of endemic or epidemic diseases, such occupations should have brought to bear upon them all the safeguards which science and art have devised. The sudden outbreak and excessive mortality of cholera in 1866, at one of our poudrette factories, was only an illustration of what sanitary observers well know, viz: that filth, although not always the originator of disease, and not always explicable as to the laws of its fertilizing agency, is, nevertheless, as great a promoter of existing disease as are certain artificial manures when applied to various crops, the seeds of which they have no power to originate; nevertheless, they impart rankness, and in some cases seem so to introduce new orders and species, as to imitate or initiate what is equivalent to original production. Facts, too, as to the courses of disease in localities which have been built on organic ground material, now prove to us that such material is unfit for the location of house structures for many years.

We do not claim that factories, or other smell or smoke nuisances, should be prohibited, or that they should be suspended from work by any too summary legislation. But we do claim that public opinion should be respected in condemnation

of these unmistakable nuisances, that their proprietors and others should come to appreciate that they are hazardous to the rights of health by reason of their gases of decay, and that the most scrupulous efforts should be made to prevent offense or danger.

The member of our board who visited the slaughter houses on the Hackensack was in every way treated with courtesy and a desire shown to secure cleanliness and to prevent foul odors. But there was not evidence that the best methods were in use for dealing with decompositions or for deodorizing the immense volumes of smoke which pour their decay-laden gases into the nostrils of so many persons who cannot recognize that thus the breath of life is inbreathed.

The great mistake generally is that effort is made to burn up and to carry off by fire and smoke some gases of decay which are not inflammable and which must be passed through water or submitted to some process of chemical absorption. This often adds to the expense, but not to a forbidding extent. Whether from a want of knowledge or from an unwillingness to incur expense, we do know that all these offensive establishments should be compelled to adopt such measures as shall abate these nuisances. The various experiences as to gas and factory and smoke nuisances, which have occurred from sanitary legislation abroad, and abundant instances afforded by the State and city reports of our own country, furnish abundant and guiding facts and literature upon this subject. On the basis of these we can now only affirm that these odors can either be entirely removed or very largely mitigated, if only it is required that the best devices for their prevention be in use. The presence of some of them in our midst is to be accounted for by the following extract from the report of the Board of Health of New York City: "In addition to the various kinds of business connected with the slaughtering of animals which, if carelessly or improperly conducted, are liable to be complained of, the attention of the board has been called to other manufacturing pursuits located in the crowded parts of the city as being detrimental to the public health. Among these may be mentioned, all factories emitting large quantities of smoke, which enters the neighboring tenements and is injurious to the weak and invalid, if not to those in health, and which deprives the inmates of fresh air and

compels them to keep their doors and windows constantly closed. As it is a fact well established in older cities that this nuisance can be abated at small expense, the board has adopted an ordinance that, from and after the first of June, 1870, every furnace employed in the working of engines by steam, or in any mill, factory, printing house, dye factory, gas house, etc., * * shall be so constructed as to consume or burn smoke arising therefrom, unless a permit to the contrary be obtained from this department." The deodorization of non-combustible gases deleterious to health admits generally of successful accomplishment. In both cases much depends, not only on the scientific methods and apparatus used, but upon the intelligent oversight of skilled and faithful workmen.

FOOT TRAVEL ON RAILROADS.

The evils arising from the use of our railroads as foot paths, has invited our attention. At the instance of a member of our board, our most prominent railroad company has kept for the last two years a record of all accidents happening on their lines. What was recognized by experience is now demonstrated by numbers. Very many of the accidents by which lives are sacrificed arise from the use of the railroad track by tramps in their wanderings from place to place, or by others for convenience in passing to different streets. Life is thus jeoparded, the unpleasantness of mangling accidents is forced upon the public eye, and sometimes other liabilities of accident are involved to passengers. We believe that it should be made a punishable offence to walk thus on railroad tracks, or at least in the case of those roads running more than a specified number of trains each day.

CLIMATOLOGY.

The board is about instituting a uniform system of meteorological observations, in order the more closely to study the bearings of climate upon health. At present the most valuable records are those of the Hon. Wm. A. Whitehead, of Newark, and he has kindly furnished to the board valuable statistics for the last five years, which are herewith presented.

To facilitate easy reference to former health legislation, a brief

codification of laws not repealed will be found at the close of this report.

Other subjects have come up for discussion before the board, to which in this initial report it is not necessary to allude. No one who surveys the range of sanitary science and its appliances but that recognizes the breadth of the field to be studied, and the variety of objects with which it teems.

It is gratifying to know that already many of our most intelligent and progressive citizens are alive to the imminent interests which are involved in these great health questions, and of their bearing on questions of social progress. Beside the labors and writings of members of the State Board, we may be said to have a valuable and increasing literature upon these subjects. There are papers and addresses by Prof. Geo. H. Cook, of New Brunswick; Prof. N. R. Leeds, of Hoboken; Prof. H. R. Cornwall, of Princeton; Superintendent Pierce, of New Brunswick; Dr. J. W. Pinkham, of Montclair; Dr. J. L. Bodine, of Trenton; Dr. H. A. Hopper, of Hackensack; Ashbel Welch, of Lambertville; L. B. Ward, of Jersey City; Col. R. S. Swords, of Newark; Rev. F. R. Brace, of Blackwoodtown; Hon. Wm. A. Whitehead, of Newark, and others, on the subjects of water supply, sewers, purity of air, influences of soil and climate, the causes of insanity, the hygiene of schools, and other matters which promise careful future study and show an intelligent apprehension of the vital concern which the whole science of sanitation involves.

It may be well for us to say, in conclusion, that the board enters upon its work with definite views as to its sphere of inquiry and of actual service.

First of all, it behooves it to become the repository of the best information to be obtained from all available sources both as to the condition of public health and as how far these come under the jurisdiction of State or local authorities. Next to its value as diffusing information among the people, it may be of great service for expert evidence as to questions of health interest which unavoidably come before the State authorities, and upon which they have need to ask for responsible and sustained information.

In some of the States, State Boards have been used with great advantage as references in cases where local board administration was resisted. A State Board has opportunities of acquainting itself with the domain of law, the limits of authority, the desirable equipoise of public and private rights, with impairments

and jeopardies to health from special causes, such as cannot be secured by any one local authority, and may often be of great advisory service. Besides, the great value of local sanitary administration is greatly constricted, unless, by a massing and comparison of the experience of localities, the whole is made available through some central bureau for public service.

With the exception of some legislation so long felt as needed in reference to vital statistics, the board has little to suggest as to legislative enactment. Some general law is ere long desirable, empowering local boards in townships as well as in cities, but this can await until there shall have been wise forethought and advice. It is our desire always to secure public sentiment, or to be able clearly to command representative authority before asking legislation. Even then our only sphere is that of wise suggestion. Time and study will yet develop how valuable to a State the services of such a board may become.

While for the present half year we have been engaged on preliminary work, we shall hope in due time to draw particular attention to existing defects and to remedies, and so to study the avoidable causes and incidents of restricted vitality as to aid in lessening the incubus of disease and death upon the population.

We submit to your Excellency, as a part of this report, the studies, observations and information which the members of the board have been able to secure on matters that intimately concern the public welfare in their sanitary bearings, and as herewith presented in special papers or reports.

ORDER OF PAPERS AND REPORTS.

I. Registry of births, marriages and deaths.

II. The protection of children from impairment of health in the home and the school.

III. Some of the more common domiciliary influences and surroundings productive of disease.

IV. A paper from the State Geologist as to localities, in which topographical and geological position and condition indicate need for sanitary intervention.

V. Endemics and epidemics since 1870.

VI. Climatology.

Codification of Laws, Index, &c.

REPORT ON VITAL STATISTICS.

BY E. J. MARSH, OF PATERSON.

It is unnecessary at this period to enter into an elaborate argument proving the importance of an accurate registry of all births, deaths and marriages, occurring in the State, as the value of such a record has long been recognized by our legislators, and laws have been passed at various times to regulate and carry out such a registration

The chief purposes of this registry are:

1st. To establish a record of the events, as a sure reference in certain cases where the rights and claims to property are concerned.

2nd. To ascertain and illustrate the social condition of the people and the changes it may undergo.

3rd. To ascertain the rate and causes of mortality, a knowledge of which is a necessary basis for a systematic improvement of the sanitary condition of the people. This last purpose will be principally considered in this paper.

In 1798 a law was enacted in this State requiring the clerks of townships to keep the proper books and record therein any marriages, births or deaths which might be reported to them by the persons interested. Such a record from voluntary application would necessarily be very incomplete, and useful in only a few exceptional instances. In 1848 another law was passed intended to remedy these defects, and enlarge the benefits of the registry. This law required all clerks of townships to find out and record all the births, marriages and deaths occurring within their respective districts, and to transmit annually to the Secretary of State a copy of such record. The Secretary of State was then to have the records analyzed and tabulated so as to bring out all the important facts and make a report of them to the Legislature. The duty of collecting the facts was subsequently transferred from the town clerk to the tax assessor, and with this

and a few other unimportant modifications the law continues at the present time. The births, marriages and deaths are collected annually by the tax assessors, copies of the lists made by the town clerks and transmitted to the Secretary of State, under his directions tabulated, and the result published by the Legislature. Thousands of dollars have been spent in carrying out this law, the various fees and expenses having of late years been over 11,000 dollars.

These records having been preserved and published annually for nearly thirty years, it might naturally be supposed that an ample fund of valuable information was at hand either to establish individual facts, or to ascertain our birth and death rates, and the various causes of disease prevailing in the State. In point of fact, however, they have not been and are not now of any use whatever; as references they are worthless and inaccessible; as indications of our present and past social and sanitary conditions utterly misleading and erroneous. The only useful purpose they can serve is to indicate the inefficiency of the present law, and tell us what not to do.

These assertions and charges may be considered too sweeping, and proof of them may be asked. If so it is easily given by looking into the practical results of the registry. Here it is found that: 1st. They are inaccessible as individual records for the reason that the names are not indexed but recorded solely in the order in which they have been taken by the assessor. Hence to find the evidence of the birth, marriage or death of any one person, search must be made through the entire register perhaps of some thousand names. 2nd. They are incomplete, not slightly so, or with a few omissions, but a very large proportion is left out. This is only in accordance with other experience. The vital statistics of the country were collected after a similar plan for the last United States census, and the superintendent of that census estimates a deficiency of over forty per cent. in the number of deaths reported. This is accounted for partly by the carelessness of the assessors or census takers, partly by forgetfulness on the part of the persons questioned and by various other reasons. Our State reports may be a little fuller, but still are very incomplete. Sometimes the assessor makes no return at all. In the Secretary of State's report for 1875 it is stated that from 32 townships no reports of deaths had been received.

Where reports have been received, sometimes more than half the cases have been omitted. An examination of any of the annual reports will show these deficiencies, but a few examples will suffice. They will be drawn from the registration of 1875, for the reason that a State census of inhabitants was taken in that same year, and the mortality rate can easily be calculated. For the whole State the mortality rate was 13.6 per 1,000, a figure so small as to throw suspicions on the correctness of the returns. In the State of Massachusetts the rate was 19 in 1,000.

A comparison between some different counties and towns will show remarkable differences. In the northern part of the State, Passaic county, with a population of 53,775, has a mortality of 1,221, or a rate of 22 deaths in every thousand inhabitants; Sussex and Bergen counties are immediately adjoining. The former has a population of 24,010 and a mortality of 231, or 10 in 1,000; the latter a population of 35,516 and a mortality of 330, or 9 in 1,000. These two latter counties show a mortality rate so small that the returns may be determined to be certainly incorrect, and this to such an extent as to render them worthless for sanitary investigations.

These instances are by no means exceptional, and the same state of affairs is found in many other counties. Monmouth reports a mortality of 6, Somerset 7, Warren 8, Hudson 9, Mercer 10, in 1,000 inhabitants. The only counties returning even a possibly correct mortality are Passaic, with a rate of 23; Essex, 22; Union, 28; Cape May, 16, and here undoubtedly many deaths have been omitted. These deficiencies are found in all parts of the State, both in rural districts and in large cities. In fact, the greatest difference appears in the case of cities, in some of which there is the merest approach to accuracy, and in others the most complete departure from it. Hoboken, with a population of 24,706, has a mortality of 728, or 29 in 1,000, while Jersey City, with a population of 104,227, returns only 774 deaths, or 7 in 1,000; or in other words, Hoboken is represented to have almost exactly as many deaths as Jersey City, which has four times the number of inhabitants. Elizabeth and Trenton have each about 25,000 inhabitants, and while the former is reported to have 746 deaths, the latter has 235, or not one-third as many.

These examples will suffice to show how incomplete and unreliable the returns are as matters of record, and how utterly

valueless and misleading for the investigation or illustration of the sanitary condition of any given district.

If, then, there is such difficulty in obtaining a mere enumeration of the number of deaths (facts which require no special intelligence or education to ascertain), it might be reasonably expected that a record of the particulars of each case would be still more full of errors, as this calls for more attention, exact memory, and even special knowledge. Among other particulars, the law requires a record of the age and cause of death. The age is generally known at the time of death, but after the lapse of a few months the exact number is forgotten and an approximate age is fixed Thus assessors and census collectors find that the round numbers give more cases than those immediately adjoining—20, 30, 40, 50, &c., show many more than 19 and 21, 29 and 31, &c. In many cases the age is not reported at all. The greatest difficulty, however, occurs in fixing the cause of death. This is a purely medical matter, and can only be determined with accuracy by the physician. The parents frequently do not know or remember the statement of the physician, and utterly erroneous returns are made, and every death is referred to some well known malady; all wasting diseases become consumption, all sudden deaths heart disease, and all infantile deaths cholera infantum or convulsions. In over eleven per cent. the cause of death was not reported. Such returns are necessarily utterly unreliable and valueless to the sanitary statistican. No one can study the cause and course of disease from such "fictitious data."

After these imperfect returns have been collected by the assessor, they are copied by the township clerk and the copies sent to the Secretary of State. They are here tabulated, according to the directions of the law, in various ways. The forms used, having been long since adopted, are followed in stereotype fashion. This work is purely clerical, or a mere calculation of figures. There can be no analysis, comment or explanation of the meaning of the figures, because there is no sanitary expert superintending the work. Hence results a yearly report of incorrect returns, obtained at considerable expense, compiled and printed for the supposed benefit of the public, but consigned by that public to a well-merited neglect. Perhaps it would be no exaggeration to say that not in a single instance have these statistics been of the slightest value to any citizen except those who have

received fees for collecting them. To the State they are valueless, unless as a stepping stone to a better system.

METHODS OF IMPROVEMENT.

From this examination of the imperfections of the present system of registration, it will be an agreeable change to turn to the consideration of the best methods of improving and perfecting the registry.

The first principle to be established is that each event is to be recorded near the time of its occurrence, and on the information of some person personally cognizant and competent to give the necessary information. The experience of this and other States has shown it to be impossible to obtain correct reports, if taken by an annual census. The births are best reported by the parent, or the physician in attendance; the marriages by the clergyman or magistrate officiating, and the deaths by the attending physician, who alone is competent to state the cause of death with any precision. Another principle is that all these returns should be ultimately dealt with by the same officials. This may not seem to be absolutely essential, but the three records have for so many years been associated as to have established a kind of law by custom.

After stating these two principles the subject can best be considered in detail, by examining the facts to be recorded, the method of collecting them and their subsequent use and preservation, for deaths, births and marriages separately.

1ST—FACTS TO BE OBTAINED AND REPORTED.

Births.—Little change is required from the present law. There should be a statement of the names of the parents, date and residence, with some witness for the purpose of identification; also, for social inquiries, the birth-place and occupation of parents, and perhaps a few other similar items.

Deaths.—In addition to the requirements for births for purposes of record, it is also especially necessary to give the cause of death, and also, perhaps, the duration of the sickness. The cause of death should in all cases be certified by the attending physician, or by the coroner if there is no physician. This is

absolutely essential. No statement of the disease at second or third hand should be permitted. Perhaps in cities a few additional statements should be required, as, for instance, for tenement houses and other points of local sanitary importance.

Marriages.—Here there should be the usual requirements of name, age, residence, date, nativity, with the names of witnesses.

2D—METHOD OF COLLECTING OR REPORTING THESE FACTS.

Births.—The difficulty of obtaining a complete registry of these is far more embarrassing than of deaths and marriages. The method of making an annual census has been found unavailable. Attending physicians might be made responsible, but in very many cases there is no physician present.

Parents might be required to report births, but, on trial, this has been found ineffectual. A rigid law, with penalties attached, or a liberal compensation for returns, would no doubt aid in securing completeness. At present some of our cities have stringent laws and are seeking accuracy. In townships, if the collection is left to assessors, they should be subject to penalty in case of neglected or incomplete returns. Outside of cities, if the duty could be made to devolve on the Clerks of School Districts in connection with their census of children within school age, the smaller area and its coincidence with the other duty might secure greater accuracy. The most feasible methods are still under the careful consideration of our board.

Deaths.—There should be much less difficulty in obtaining a complete return of deaths. The event of death is, in a certain sense, a most public one, or at least the final disposal of the remains is public, and is a fit subject for legislation. This is advisable, on the grounds of decency, health, and the prevention or detection of crime. In many of our cities there are efficient municipal laws on the subject. No burial of a corpse is allowed without the permit from the proper officer, and such permit can only be granted on the certificate of the attending physician or coroner. These certificates are made to cover all the points required for registry. An extension of this law to all parts of the State would give a complete registry. The only apparent objection would be that in rural districts it might, on account of distance or otherwise, be troublesome to find the officer appointed

to give the burial permit, but the law could provide for such a contingency. In cities this officer is usually the city clerk, unless there is a special officer designated as registrar of vital statistics. In villages and country districts it might be the assessor, or if the township were of great extent and the population scattered, or in the absence of the assessor, or in other emergency, a justice of the peace might be authorized to give a special permit. City clerks or registrars should keep a list of all practicing physicians.

Marriages.—There should be no difficulty at all in obtaining a proper registry of marriages. Marriage being a civil rite, regulated by law, by authorized persons, clergymen and magistrates, these persons can be directed to make the necessary returns to the proper officer.

3D—USE AND PRESERVATION.

The first statement or certificates of the events being obtained and in the hands of the city or township officer, their proper use for sanitary, social and statistical inquiries, and their permanent preservation as records for future reference must be considered. As permanent records their proper place would be the county clerk's office, with other similar papers. For other purposes, they should be examined, tabulated and analyzed at stated times, by competent persons for the State at large.

At such periods as a general law might specify, all these returns, or a certified copy thereof, could be sent to the Secretary of State, that expert examination might be had of all the returns from every part of the State, so that a State Report could be prepared thereupon. The original certificates, if these had been sent, could then be alphabetically arranged and returned to the office of the county clerk of each county, or to the keeper of permanent city records, for permanent future reference. This would avoid the double expense which now occurs in many of our cities by reason of both State and municipal collection of returns.

The amount of compensation would not need increase unless a duplicate was required, and even then the full expense would be much less than that which now accrues in each township by reason of one unnecessary copying, and in many cities by reason of a double collection of statistics, which, practically, however,

is often double only as to remuneration. The change would at once elevate this class of vital statistics into the field of approximate accuracy, and enable us to study many health and life problems by the light of tabulated, significant and reliable records.

Report on the Home and the School in Their Relations to Health.

BY EZRA M. HUNT.

I. *The Home.*—It cannot but be admitted that the most fundamental of all the relations of the citizen is that which concerns the Home. The domestic condition of a people is one of the weightiest concerns of the statesman. That is a wise administration which does the utmost that is practicable to secure to each person a residence where the best conditions of physical, intellectual, industrial and moral development are secured. Felt embarrassments, already meeting us in dealing with our population *en masse*, are teaching that somehow we must reach more effectually the starting point of influence. If the foundations be destroyed, what can the nation do? The studies of social science and the examination of social facts and results, are constantly illustrating how intimate are the blendings of home influence with all that constitutes the personality of the citizen and the welfare of the State as involved therein. In a republic, where the relation of each man is that of a citizen-voter, as well as that of a subject and co-laborer, the importance of the elements at work in providing material is essentially magnified. It would seem sufficient simply to announce the principle that the ability and usefulness of the citizen—his ability to govern and be governed—is more involved in his home rearing and home-surroundings than in any other one question of outward situation and circumstance.

But when we pass to note facts in evidence, the modifications resulting from parentage, early training, home life, both youthful and adult, and the sanitary associations of domestic conditions, are still more significant and abiding.

The laws of physical inheritance and the modification of these laws by home surroundings and influence, are not less definite

than those of moral and intellectual force. Take up, for instance, the tenth report of the State Board of Charities of New York as relating to the causes of pauperism, and see how the results grow out from social and domestic conditions. Study any great circumstance as to the social *status* of a people, and you will more and more come to realize how much in individual and congregated instances is a legitimate result of present or former home life.

Nor is this as purely a question of intellectual and moral training as some seem to suppose. We cannot unwrap a man, woman or child from the folds of personal bodily environment.

The body, its growth, its care, its culture, and all those influences which have to do with its preservation in health, are no inconsiderable concerns in their bearing upon the common welfare. While we cannot agree with those who would resolve all mental and moral into material acts, and consider imperfect judgments and sinful deeds the result of disease, yet it must be admitted that abnormal physical conditions and bad household situations and unsanitary surroundings are large elements in mental and moral degradation. Even the demand for unnatural stimulus is often, in part, the result of depression arising from bad air and imperfect food. Alderman Waterlow, of London, and others, have shown by positive example how the poorer classes can be elevated in character by providing them comfortable homes.

The question of the health of a family is largely determined by the homes in which its members have been or are now being kept. These, too, determine whether they are to belong to the sustaining or depending class of society; whether as producers or consumers they occupy, or will come to occupy, a place in the commonwealth. This is one of the criteria of their value as citizens. If there is any one fact which sanitary science and investigation have made manifest in the last decade, it is that health and disease are far more within the reach of prevention, modification and control than was once estimated.

The power to improve bad physical organizations and to prevent new invalidity by hygienic influences is much greater than even physicians formerly supposed. Infantile diarrhœa and other bowel affections, once attributed to unavoidable accidents or considered the inevitable penalty for living to a second sum-

mer, are now unmistakably traced to intense heat, to imperfect feeding or care, and to a very few other classifiable and mostly avoidable causes. Of the 21,204 deaths in 1874 in England from this cause, 18,024 were under five years of age. When, as in such cities as New York and Washington, we look after causes, we are not slow to identify a very large proportion as associated with evils directly connected with home life. We need not compare the enormous mortality with the small per centage of country districts, but comparing different cities, or parts of the same city, can easily show where and why disease is domiciled. Indeed, the graphic statist can beforehand draw his lines of greater and less intensity and predict the diarrhœal wave.

Developmental diseases, or those having their manifestation during the period of youth, are definite both as to their causes and as to their limitation or prevention by good home management.

Contagious diseases, of which scarlet fever and diphtheria are especially formidable with the child, and typhoid (enteric) fever and small pox among the grown, are not only dependent upon specific contagions, but the question of their malignancy, if not of their occurrence, is largely influenced by the condition of the premises into or upon which they alight.

Not less measles, whooping cough, croup and erysipelas are counted among those zymotic diseases largely controlled by immediate surroundings and dwelling houses.

Consumption and other lung diseases making up so formidable a number of invalids, and tabulating so many thousands of death each year, are more controllable in their preventive and early limitation than in subsequent treatment. Damp houses, undrained premises, inadequate food, imperfect clothing and ignorance of those laws by which temperature is controllable, add many a victim from those who might be saved.

It is not our purpose to furnish any exhaustive list of the avoidable diseases which are often engendered by imperfect home management, but merely to draw attention to the fact now so fully recognized that these are within the province and duty of home prevention. Besides it is not to be overlooked that many who inherit imperfect constitutions, and yet who do not succumb to disease, might be greatly improved by proper rearing, and that many of naturally good health are so placed under

untoward circumstances as greatly to impair their vitality. Such may not find an early place in the records of mortality, but by their imperfect existence their power of labor is impaired, their happiness curtailed, and others, it may be, through them, inherit an imperfect organization. The State is crippled by the home-errors of its citizens to an extent that is a matter of legislative concern. Governments seem too often constrained to provide for the results of imperfect lives, when much of the necessity might have been avoided by legitimate attention to the causes. While we are spending our millions on asylums, penitentiaries and pauperism, and suffering nationally because the consuming are gaining upon the producing classes, it well behooves us to consider whether we could not somewhat turn the stream at the fountain, and so influence American home life as to lift from it some of the burdens of ill health, sickness and death, and more fully insure in the families which make up the State the bodily conditions so indispensable to profitable labor, to thrift and to usefulness.

If not a very intellectual, it is nevertheless a very matter-of-fact view, that in every home human animals are being cared for. The adults are animals upon whose proper air, food, and surroundings not only their comfort but their life-force depends, and each child is an animal in process of growth under conditions which will very much determine what the future available power shall be. Spencer has said, " The first requisite to success in life is to be a good animal." The body is the machinery which is to be operated, and in so far as it is incapable of responding to the demands made upon it by its other resident or rather interwoven forces, in so far it is defective machinery, which is not fully equal to the service legitimately to be expected of it. So far as this is avoidable it is a burden which ought not to be imposed. So far as close rooms, irregular heating, mouldy dampness, impure water, bad sewers or outhouses, unfit food, accumulated filth or other preventible things are making sickness or causing the lowering of health standard, so far it is highly desirable to secure abatement. The limitation or removal of all such inflictions is as much for the interest of the State in its corporate capacity, as for the household in its family welfare.

There are two methods by which the State is to operate in this direction.

The first is by a proper diffusion of information and direction upon such matters among the people. It is well recognized that the government has an educational relation to children, not as a mere gratuity, but under the law of self-preservation, for without a fair degree of intelligence Republics are only ephemeral possibilities. But there is information for adults as well as for children, bearing so directly on civic welfare, that it cannot safely be dispensed with to the extent in which it is purely protective and does not involve burdensome outlay. In the homes where adult and young life are most affected by surrounding influences and where the health of all is dependent upon domestic arrangements, we cannot afford to leave the people in ignorance of the guiding laws of life. They must be informed as to the more comprehensive axioms of physical welfare and be warned against those insidious and frequent evils which are apt to be underestimated or overlooked, and which so often entail invalidity.

It is for this reason that so many European governments have instituted health authorities, whose duty it is to study those great questions which have to do with the social and domestic life of the people, and have enforced those methods which improve domiciliary indwelling. Our American methods being more at first to convince rather than compel, various States have established Boards of Health, whose duty is to point out those evils which are most distinctly certified, to present the methods of dealing with them, and by an annual report acquaint the people with their dangers and their relief. It is thus that we may hope to elevate and educate the families of the State into a degree of intelligence in such sanitary matters as most intensely concern the common welfare. These are interests that require for their elucidation and presentation the expert study of the scientist, the physician and the engineer, and yet when duly examined are capable of being recognized as of saving value by the people at large.

With all that may be said about the dilatory carelessness of householders to avail themselves of proper appliances for health, it is nevertheless true that unsanitary conditions are not so apt to prevail among those who are informed.

Many a man who now has his well too near the outbuilding, his house drains and cess-pools badly situated and managed, or

the necessary off-fallings of domestic life illy disposed of, would have made more suitable provision at the start had he known the dangers of contamination and the intimate relation of these untoward circumstances to diminish vigor.

With forcible facts before him, or the assurances of those who are fully informed, he is more likely to make indicated changes and to prevent the repetition of his error by those about to construct for themselves.

The need of pure water, its liabilities to contamination, the simplest tests of its purity, the necessities of good air and the means of securing it, the laws for regulating heat and moisture, the bearing of ground and house drainage on health, the laws as to foods and drinks, the evils of uncleanliness, and manifold other subjects, of which these are passing illustrations, if fairly presented to households are capable of comprehension by very many who have never thought much about them before. By the enforcement of clear principles and supporting evidence they educate on points in which individual comfort is concerned, and so have the chance of appreciation and application independent of the enforcements of law. Even where there is still neglect, they make that public opinion which the more readily accepts the enforcements of law in those cases where the corporate or local authorities deem its intervention necessary. The welfare of the State is so inherently involved in household health that it may well put forth some effort to conserve it.

It is partly in this view, too, that sanitary inspection has accomplished so much for those cities in which it has been most thoroughly carried out. All outside and general sanitary circumspection has been found inadequate in dense populations until it has been extended to a care for individual houses. There must be dealing with the root of the evil. It is the testimony of very many of these inspectors, as we have reason to know by careful examination of numerous reports, that they have often been of as much service by awakening the attention of the inmates to evils from which they were suffering, as by any direct insistance upon the application of legal requirements. While this may not be needed in less aggregated populations, yet in many larger villages and towns much benefit might be secured in this way.

In every school district of our free school State a member of the

Board of Trustees visits, or should visit, each house, for the purpose of enrolling the children who may be entitled to the benefits of the school fund. If the duty is not delegated, he is generally a person interested in the welfare of his neighborhood, and of the homes which each day send a part thereof to that next most prominent home, the public school. We believe it would be entirely possible to have such an one inquire also into the sanitary condition of domicils, and endeavor to guard the population there from those unhealthy influences which prevent so many of our scholars from growing up into all that stalwart fullness of health which is needed for the varied avocations of life.

There will, no doubt, still be a large class who from ignorance, from carelessness, from indifference or other causes will not respond to any methods of information, and for whom it may be necessary to invoke the enforcements of law in those cases where private rights or the public good are too gravely imperilled.

The crowded tenement house, the unkempt premises and those mentally or morally degraded will no doubt ever need the traction and scavenging of law. This will neither be difficult nor oppressive when those competent to discern come to appreciate how much one and all are involved in the protection of each home from such preventable sources of contamination as are within the range of ordinary ownership or tenancy.

It is because these interests of healthy home-life are so imminent and vital to the State, and because it is desirable, as far as possible, to substitute the intelligent appreciation of the household and the citizen for the rigorous enactments of compulsory legislation, that we desire so much the diffusion of knowlege as to the intimate relation between imperfect life-force and abatable causes of invalidity in the homes of our people.

The second method is by the direct exercise of legal authority. While it is our American boast that every man's home is his castle, yet we are not to carry liberty into license and make the independency of the individual a tyranny to society. If my fellow citizen runs stenchy slops into my street gutter, or keeps his premises in such a condition as that positive disease is engendered thereby, he is the oppressor and must be restrained. We would surround his personal rights with all due precautionary

protection. We must have the evidence clear. But, nevertheless, the right of dealing with such cases must be recognized and duly exercised. While we believe most in instruction, in persuasion and in that inspection which is at first informatory rather than compulsory, we believe the State has great occasion to inform itself as to the requisites of household health and the sphere of legal enactment in preventing concealed or open nuisances, such as are perilous to life or inimical to vigorous vitality. We would thus have it recognized that the condition of each home has a direct bearing upon that public health and public comfort which are so important to the welfare of the State.

The proper diffusion of intelligence, such inspection as is informing, instructive and precautionary, and if need be, such laws as compel the abatement of pronounced and unmistakeable nuisances, are the safe guards to the health of the citizen and to a degree the inalienable rights which municipal or State law should secure to their respective constituencies.

II. THE SCHOOL IN ITS RELATIONS TO HEALTH.

For the child there is another home beside that which he finds under the family roof. By the laws of our State, from the age of five to eighteen, he is recognized as having his appropriate place in the school-room. He is here to spend no small portion of his waking hours, under circumstances and conditions most vital in their bearing on all that relates to his future life. It is a home constructed for him by the State itself, in the common interest of the child and of the commonwealth. By law he is made the ward of the government. It behooves it well to consider the terms of the guardianship and the charge involved. He is here to be fashioned as to his body and as to his health, no less than as to his mind. It is a deep, broad and high concern of society whether the boys and girls who, at the age of five, crowd to the school house door and are seated in the school room for a period reaching over ten or twelve years, are there to find those aids to physical health to which they are entitled by nature and which involve so much as to the effectiveness of their future citizenship.

May we not apply as an axiom the idea of Simon, in another connection, and say, That whatever work the State assembles its

children to do shall, as far as depends upon it, at its cost, be divested of all needless unwholesome circumstances.

It is not a mere charity, but for the public welfare, that the free school seeks to offer to the masses such education as can be received amid the best conditions for health. Fitness for the labor of life is the ultimate result sought. It is not for special intellectual eminence that New Jersey opens wide the door of ingress to the free school. It is for usefulness. Far more than is generally felt this means such education as will make the person effective in his or her occupation. It is that it may fit the pupils for entrance upon their life-*work* which, with the most of them, means manual labor. It is to give that training which will make them *force-full*, not only as to skill and intelligence, but as to bodily endurance, too. Labor is to be the working capital, and that preparation which does not recognize this is fearfully incomplete. They are to be *operatives*, and they are to operate their bodies in skillful handiwork, not less than the student does in more isolated brain work. The school-child body is not a mere outside wrapper for the mind, to be taken off when the mind is polished aright, but is itself the very instrument. Indeed, in a sense the mind is secondary, the body primary. The body is fitting to be worked by the mind, just as much as the mind is being trained to regulate the body.

The casket is not to be broken and thrown away so soon as the jewel becomes brilliant. It is the casket that is to be handled and made strong for the inevitable stress and strain to which it is to be subjected.

It is at a time, too, when over tension, or cramping restraint, or unfavorable conditions in anywise, will tell for permanent evil more than at any other period of life. The fact that "children are young and can stand a great deal," is over-stated. In a weighty sense, because they are young they are far more susceptible to deranging influences, and the symmetry of coming life is more easily marred.

The young lives, as Simon puts it, are finer tests of foul air than are the elder and perhaps acclimatized population. Many an influence resisted by older lives, if exerted during the formative periods tells for permanent impairment of a normal vitality.

Besides being the period of general impressibility, physically

as well as mentally, school life includes the two crises of second dentition and puberty.

There are not only the physiological processes of organs to be performed, such as circulation, inspiration, secretion, etc., but growth is going on meanwhile, and, besides, there is the special awakening of new activities at these periods. The nervous system is aroused into its highest ardor, and all susceptibilities are increased. Wrong management not only affects organs, but development. Two vital processes occurrent at the same time are more easily deranged than either could be alone. Still more dissonance is possible when we consider that the derangement of either breaks links in a long and exquisitely wrought chain of harmony, and so disorders generally.

Experience is constantly informing sanitarians how frequently the disabilities of physical life have their foundation in school circumstances. Thus the child, instead of having himself developed into capacity for life work, is so educated that one department of himself is trammeled and often terminated by the other. One leading design of common school education should therefore be to make the body effective, and so to culture the mind and soul as that they shall administrate the body wisely to this end.

Yet in the attempt to impart capacity we organize incapacity; for nothing turns into incapacity so fast as ill health.

Jarvis and other eminent statists have made careful computations to show how many days and years sickness abstracts from the effective force of individuals, and so from the capital of the State.

If the same examination is conducted as to the shortening of the labor period by too early exhaustion or its embarrassment by partial invalidity, it is found that the aggregate force and the aggregate years of working life are being abbreviated.

A degree of this may be traced not only to the "tyranny of a bad organization," but to the equally destructive tyranny of school-day experiences, which has made sad havoc with many a hardy scion or failed to enable those less favored to grow into a vigorous manhood. For not only should the school-room and the school secure the requisite condition for vigorous health, but both, by regulation and instruction, should indoctrinate the pupils into the conception of the necessity of health, its depen-

dence upon right management, and should guard them against those evils to which they are most naturally exposed during the period of their growth.

So far from accomplishing these positive and educational results, how patent is it that at the present day the average school-room and the usual process of education greatly imperils the health of the pupils.

Turning in manifold directions, we have only to compare the actual conditions which obtain, with the well-understood requisitions of a healthful vitality,

AIR CONDITIONS.

Take, for instance, the two leading necessities of good air and regulated temperature.

Boston schools are nearest a model of any in this country. Yet in an examination of forty, made in 1871, "the average proportion of carbonic acid found was 1,393 parts in a million, or nearly four times the normal amount existing in the outer air. (See Mass. State Board of Health Report, 1871, page 405.)

Dr. Endermann, in a series of examination of schools, in New York city, in 1872, found the proportion of carbonic acid varying from 1,400 to 2,700 parts per million.

Of forty-six school-rooms examined by Prof. Kedzie, in Michigan, but four gave less than 1,200 parts of carbonic acid per million; twelve from 1,200 to 2,000; nineteen from 2,000 to 3,000, and one from 4,300 to 4,900 parts per million.

Last year the city government of Cincinnati authorized Prof. I. B. Hough "to make such surveys of the school buildings and chemical analyses of the atmosphere therein as should establish clearly and fully their actual sanitary condition."

We quote as follows from his elaborate report:

"It will be seen by the appended table of analyses, that a number of school-rooms were found to contain considerably more than one-tenth per cent., (the amount stated as tolerable,) and that even in the best ventilated rooms of the newer houses the per cent. is quite materially above the average out-door quantity. It is true that a person can become habituated to the endurance of a vitiated atmosphere, * * * a process

which, though it trains the child to live on impure blood, yet trains it to live a poorer and feebler life."

The report covers over forty different rooms, and draws the conclusion "that in a large majority of cases the ventilation of our school-rooms is injuriously defective."

As to air space, it is generally conceded that from 200 to 300 cubic feet is the smallest allowable for each pupil. Yet in 265 rooms in this great city of schools only 29 afford 300 cubic feet, 166 less than 200 feet per pupil, 22 less than 108.5, 14 less than 100.

There was often found great defect of pure air, of moisture, and various defects in other regards.

In twelve school districts the schools were reported as suffering from the odors arising from neighborhood nuisances. There is no reason to believe that the showing as to ventilation, etc., is beyond that occurring in many of our cities, and in no inconsiderable degree in very many towns, villages and rural districts of this State.

Brooklyn makes no better showing, and the fine architectural schools of Philadelphia are strangely defective as to their ventilation. Such schools have the principle of Babcock's Extinguisher. As it puts out fire by its surcharge of gas so do these effectually obscure the light of intellect.

In villages and towns, while there is more freedom for air, there are lower ceilings and less care is taken to discharge the air at recesses or at the close of the daily session, because janitor service is less perfect. The exposure to draught is greater and teachers as well as scholars come under our care as a result of bad ventilation. It is to be borne in mind too that children by virtue of their growing and "active vitality in proportion to their weight are twice as powerful as adults in deterioriating the air which they breathe." Being seated much of the time at nearly the same level, and that not so favorable as if a higher one, they are more apt to rebreathe the same strata of foul air. Air which has been once breathed has lost about 5 per cent. of oxygen, and had added to it 5 per cent. of carbonic acid. Stoves and furnaces add to this lung supply of carbonic acid.

Besides the amount of carbonic acid is not to be regarded as the full measure of vitiation. Soiled clothing, and exhalation from the skin and lungs, bad breath and the results of imper-

fect food and digestion give to many of our public schools a fearful amount of floating organic matter.

Amid the lower classes many a boy has his clothing saturated with the smell of his untidy home, which for want of sufficient change of garments is not swept away by outer airing. The lungs and the skin throw off watery vapor to the amount of 25 to 40 ounces each 24 hours, and organic impurities of 30 to 40 grains other than the vitiated air of the breath are constantly being voided. In the great open, and with cleanly clothing, these find easy riddance, but not so in the huddled embrace of the desk row. The aggregation of children under such circumstances too often causes them to be distributers of contagion.

Facts as to the potency and putrefactive decomposition of organic matter plainly point us to increasing care as to its constituency and harm in school-room atmospheres. Dickens describes it as a "strange unwholesome smell, like mildewed corduroys, sweet apples wanting air, and rotten books" (David Copperfield, page 33). But even when present in quantities more deleterious than the carbonic acid, it is not always detectable by the senses. The headache and general malaise from which school children often suffer is largely owing to this.

HEATING.

As to Heating, most are well aware that this is apt to be very badly regulated in the school-room. Imperfect attention to furnaces or stoves, made to generate carbonic oxide or other bad gases by extreme heating or shut dampers, give rise to manifold evil results. In fact the entire regulation of heat as to our schools needs the care and study of teachers, school officers and the public generally. The introduction of anthracite coal instead of wood has much complicated the whole question of ventilation and heat, so that our schools suffer greatly from sudden extremes of temperature and from air whose impurity is increased by the heating arrangements. Beside other impurities, ordinary coal gas has usually from five to seven per cent. of carbonic oxide. (See Wood, Public Health Ass'n, vol. III.)

Often the interference with moisture or distance from the dew point is so great that the air passages are irritated, and catarrh, coryza, bronchitis, or more serious lung affections result. This

undue dryness of the air, as shown by Buckheim, constricts also the depth of inspiration, and healthy evaporation is embarrassed. Virchow rightly attributes most of the pulmonary diseases of children to overcrowded rooms, to changes of temperature in passing from hot rooms to the cold stairways or outside, to the dust of the school-room and the impaired respiratory movement induced by prolonged sitting. I once asked Brown-Sequard how it happens that nervous diseases abound more among Americans than with the quick and versatile French. His reply was: "Your miserable hot-houses have much to do with it."

It must be admitted and realized that the evils of defective ventilation and heating find their intensest illustration in the average American school room. There are so many disturbing elements, so many embarrassing complications. The audience is a child audience, in an assembly room where they sit much of the time and stay several hours in succession. The individuals are not re-dressed for the occasion like a church or concert audience, not under charge in small groups as at home, nor to leave in an hour, as in the usual public hall, and are of ages, of clothing, of conditions of health, and of home life so different as to give great variety of susceptibility. They are, too, very differently affected by the mental processes they are attempting.

We must realize the embarrassment and not despair because of its reality. For the coming nation, the young citizen is here at a time when unsanitary conditions will tell upon the household at home, and upon the future of the child always.

The cry of philanthropy and political economy, and of State free school jurisdiction is, that we give concentrated attention and investigation to the subject proportioned to its difficulty and the stern gravity of the interests involved. The wardship we have undertaken must not be discharged at the expense of the health. If health or being itself is imperilled in learning to conjugate the verb "to be," or if a knowledge of the boundaries of Siberia involves pulmonary risks equal to a voyage thither, better have a little less learning and a little more strength.

These are vital questions to a degree that involves not only personal comfort, but the threatenings of race-degeneracy and national decay. The present condition, both as to ventilation and heating, can certainly in very many cases be amended and made to accord with well ascertained methods of improvement.

Besides these prominent interests as to air and heat, there are other infringements having important bearing on public hygiene.

In many districts greater care should be exercised to insure personal cleanliness. That old adage "Cleanliness is akin to Godliness" means all it says. An eminent British sanitarian began his reform by changing the "personal" of his tenants. The wash bowl, the glass and the penny comb in the pocket are valuable when at the command of the pupil. When water is cheap and paper towels are available there is no excuse for soiled face or dirty hands. In the best schools of Holland there is beside the teacher an attendant, who sees to the personal condition of each child upon entering the school each day. This one thing has something to do with Holland thrift as well as Dutch neatness. Children who are not washed all over each week, whose clothing is soiled by the grease and dust and bodily secretion of months are sources of air poisoning that can not be disregarded. Long hair and foul caps are good nestling places for harmful particles. Such persons are not in the best condition for mental work. Facts as to zymotic or other contagious diseases are rapidly showing us how such persons become common carriers of disease, and how epidemics otherwise mild and circumscribed are made malignant and wide-spread. The cloak room, in which the outer garments of children are so often huddled together, instead of being a dark side closet, should be a well-aired room. While we have no disposition to interfere with the rights of dress unduly, yet the right to dirt is not as inalienable as that of life, liberty and the pursuit of happiness.

The increase of eye diseases is marked in our own country as well as in Germany, England and France, where it has attracted large attention. Agnew, Loring, Derby, Williams and other oculists here have fully pointed out the facts coming under their cognizance. Modes of study, the individual position, the direction and the intensity of the light are greatly concerned in this. The usual arrangement of desks compels many of the pupils to face the light or to receive it too fully sidewise.

What is called the architecture of school buildings is far too little directed to proper lighting. Near-sightedness, weakness of eyes and need for artificial helps early in middle life accrue from the school oftener than as a result of any congenital defect. In the frequent black-board exercises of schools we have noticed

how, by reason of their position or that of desks, the pupils before them are not able to adjust their positions at the angle or distance that suits them. Indeed confusion in figuring often arises from constricted distance or undue shading or glare of light. These boards are often on the wall, along the aisles, with but little intervening space, and with unfavorable illumination. The eye is a great organ, for the mechanic and merchant as well as for the student, and we greatly need to have more attention turned to such care of it during school life as shall not enfeeble it for the present, or shorten its time of effective service after the meridian of life.

The evils of defective desks and constrained positions and an inordinate use of one side to the neglect of the other, are points telling much upon form and symmetrical development. Rudolph Virchow asserts that the schools are largely at fault as to modes of seating and posture, and thus accounts for distortions of the spine, and especially that form of curvature known as scoliosis, or lateral curvature. There is much in the present arrangement of desks to disturb that equilibrium of antagonistic muscles on which erectness depends. Hamilton, in his recent complete work on surgery, says, as to treatment, "Boys must be taken from the desk, the counting-room, and from the school-houses, where they are compelled to sit many hours each day upon benches without backs, and girls must be taken from schools where health is always held subordinate to deportment and scholarship."

Females, more especially, are found to suffer from malposition and congestions in the pelvic, even more than in the spinal region. Some three years since Brown Sequard delivered a lecture at Washington, in which he claimed that "there is a connection between development of the brain as regards the mental faculties and the development of the brain as regards leading movements on one side of the body." He avers that in education "an important point should be to make every child, as early as possible, use the two sides of the body equally—to make use of them alternately. Not only the right hand but the right side, in all its parts, is put too much foremost. There is a much greater difference in the power of motion and sensation in the two sides with very many than is supposed. In girls this is especially manifest, as not so much equalized by out-door exer-

cise. Various necessities of posture and constrained sitting in school, foster this tendency. This want of coördination, and the use of one side out of proportion to the other interrupts the dualty of nature, and gives rise to muscular disabilities." What is called the "writing position," by Guillaume, inclines to this.

The increase of nervous derangement in all grades, and of varieties of paralysis showing themselves too early in life, should lead us very closely to guard against those strains on the nervous system, which either cause lesion or such impairment of function as manifests itself in spasm, paralysis, chorea or other disorded states.

An article before the American Social Science Association, May, 1875, by Dr. D. F. Lincoln, of Boston, ably treats of "The nervous system as affected by school life."

He speaks especially of dyspepsia, sleeplessness, irritability, headache, chorea, neuralgia, hysteria, spinal weakness and menstrual anomalies and general depression, as directly resultant oftentimes from traceable school errors.

THE MATTER OF SEATING SCHOOLS.

The matter of seating schools, the size and mode of desks and the variations imparted by recitations and other changes, should receive far more attention from a hygienic view than they do.

Not only the locality and the kind of seats, but their adaptation to the size of the pupil is most important. The back of the seat slightly rounded, should fit in just below the shoulder blades, the width of the seat support the leg about half way to the knee, and the feet always very easily reach the floor. With the tendency to sit forward in the seat, a slight inclination backwards is desirable. The edge of the desk should be just opposite the nipple, with a very moderate slant, which really would be better varied by the character of the work to be done upon it.

Dr. Guillaume gives the following as the proper heights for desk, stool and seat back—11 Swiss inches being equal to 13, English measure. Where there is an inclination, as in the usual desk, the edge may be a trifle lower:

HEIGHT OF PUPILS.					HEIGHT OF DESK.	HEIGHT OF SEAT.	HEIGHT OF BACK.
Feet	Inches		Feet	Inches.			
3	6	to	3	9	15.8	9.5	11.9
3	9	"	4	2	17.0	10.3	12.9
4	2	"	4	5	18.1	11.2	14.0
4	5	"	4	8	19.2	12.2	15.0
4	8	"	5	1	20.4	13.1	16.1
5	1	"	5	4	21.6	14.1	17.2

The evils arising from lofty buildings and long flights of stairs have attracted the attention of some observers. Children, in our cities especially, are thus often constrained to this somewhat unnatural and unduly fatiguing exercise. It is an especially exhaustive motion, throwing the pelvic and other muscles into unnatural action, and deterring some from exercise in order to avoid repeated ascent. It is said that man is the only animal who will voluntarily climb a stairs. "It is recorded in the memoirs of the incomparable Martinus Scriblerus how, in his eager pursuit of knowledge, he met with an extraordinary misadventure through the ignorance of his assistant, Crambe. Having secured the body of a malefactor, he hired a room for its dissection near the pest fields of St. Giles, at a little distance from Tyburn road. The body was carried by night without much difficulty on Crambe's back, who found it easy, being both young and lusty, to travel along the level road, carrying on his legs the double weight of the malefactor and of his proper self. As soon, however, as he commenced to ascend the staircase, the wonderfully increased exertion (twenty to twenty-five times as great as before) began to tell upon Crambe, and, as the accurate narrator records, upon the corpse also; in consequence of which Crambe dropped his burden in disgust and fright and allowed it to roll down the staircase, while he himself ascended breathless into the upper room, where Martin, scalpel in hand, eagerly awaited the arrival of his expected subject." We cannot vouch for all that happened to Scriblerus or his Crambe, but here, at least, the laws of animal mechanics seem to magnify the reality of the burden, for the work of carrying loads horizontally is easily shown to be about 1-25th part of the work done in lifting the same loads vertically through heights equal to the horizontal distances.

IMPERFECT JANITORSHIP.

The duties which ought to devolve upon a school house attendant or janitor are among those most important and yet most frequently neglected in our public schools. In Germany in all schools of good size the janitor lives in the school building. It needs to be realized that the buildings require to have brought into requisition most of the principles which apply in the proper care of a family dwelling. It is good *housekeeping* that our schools must have if we wish to have them to be places for the keeping of health. No woman at the head of a family would think of putting thirty or more children in one room for each day and leave its sweeping for the close of the week and its general cleansing to a yearly overhauling. Not merely disorder, but dust, dirt, greasiness and unavoidable friction and use must make any such room unhealthy unless its need of this housekeeping attention is recognized. Too often the service of the janitor has in it but little akin to the care of the good house, and consists merely in attention to a general sweeping and clearing up such as conveys the idea of respectable appearance to the average man. But of all other rooms the school room most needs the introspection of diligent attention. Thorough airing of it and the side rooms adjacent is desirable at the close of each school day, soon after the scholars have left. Such sweeping as not only cleanses the aisles, but about the desks must be quite frequent. The dusting looks not merely after the upper surface of the desks and seats, but after the books and whatever things may have got out of place among them. A washing of the desks occasionally is needed to remove the soiling that inevitably occurs. No kind of furniture more frequently needs the renewal of a coat of varnish than that of the school room. In large and crowded schools, when not too cold, an emptying of the air by opening the windows at each reccss will be of advantage and the room should be entirely vacated.

Care should be taken to see that the cellar and all unfrequented closets are kept clear from the gathering of any nuisance and these should be included in the daily care.

In smaller schools where no attendant is employed, similar care should be exercised by the aid of the scholars under the direction of the teacher. Indeed, in either case the teacher should

be held responsible to see that proper housekeeping is secured and consider it as a part of his work thus to protect the health of his pupils. A personal sanitary inspection each week, which shall include the basement or cellar, is an important part of his supervision.

The care of the grounds also requires some attention that all causes of nuisance may be avoided. As their pleasantness and the various arrangements for recreation and exercise that can be devised, aid much in relaxation from study and in that diversion which is refreshing, these come into consideration as bearing upon the hygiene of the school as well as upon facilities for exercise. It is often noticeable that girls too frequently spend their recesses in the school room and so not only prevent its refreshment by air, but also fail to secure that benefit which ought to be derived from a brief outdoor enjoyment. The whole subject of the relation of the school grounds and of gymnastic provisions to health is too extensive for discussion here and we only refer to it as to be recognized in its bearing or successful education within.

PRIVY CONVENIENCES.

The privy and the well are the two prominent appendages to every school property which need to be carefully considered and provided for in all schools.

Where, as in some cities, all provision is indoor, there is some advantage in the easy securement of cleanliness, under careful inspection, but all the evils that may arise from foul gases, imperfect traps and ventilation, and imperfect flushing are to be sedulously watched. The water closet is to all intents a public one, in that it receives the excretions of those differing more in health than do members of the same household, and bringing together masses, some of whom are not unlikely to be affected by bad sanitary administration at home. The closet itself should always have secured to it special ventilation, and the janitor daily employ some disinfectant to secure greater cleanliness. For out-door arrangements the number of appliances have kept pace with the practical difficulties involved.

The "school sink," much used in New York city, is thus described: "It consists of a long iron trough or tank, (with water

in it) at one end of which is a draw-cock, giving a good supply of water, and at the other an aperture of exit, secured by a plug or stopper. When it is desired to get rid of the excrementitious mass the plug is removed, the water at the other end turned on and the contents soon swept into the sewer. The plug is then replaced and secured and the sink is again ready for use." (N. Y. 17 City Health Report, 1870.) This is not so easily disordered as contrivances depending on the pupils, and if attended to each day secures against the evils resultant from entire dependence on the traps in the connecting sewer.

The common privy vaults or ash pits, if cemented or so arranged as that buckets beneath would receive the daily contents, are far more easily managed than household privies, for the reason that they are used only a part of the day and on Saturdays are entirely unused. Abundant opportunity is thus afforded for that frequency of change which avoids large accumulation, and avoids also that decomposition which is the chief nuisance of these outbuildings. It is the amount that renders the condition uncleanly and embarrasses its removal. If the janitor each day sees to the condition of the privy inside, this of itself would usually secure neatness, and if the accumulation is removed each week both the ease of disposal and the value of the material commend the method. But, alas, an entirely opposite course is pursued. All this is regarded as vacation work. Too often the early summer finds the school midden already too foul for endurance, and the filthy mass is left for a summer vacation disposal. All this is so totally wrong that the teacher and the trustees must see to it that this prevalent nuisance of annual or semi-annual clearance is summarily abolished. Let a weekly or monthly removal be enforced, and all such embarrassments vanish.

The use of lime, plaster, etc., are always of service to correct any odor, and there is greater reason for absolute cleanliness and less excuse for exceptions to it in the school outhouse, than in those more constantly in service.

WATER SUPPLY.

We have always insisted that as far as possible each school should have its own distinct water supply. If from a city pipe, it should be so introduced as to be easily accessible, and should

have near it a cup and a self-emptying wash bowl, for the use of scholars. It should be supplied to each floor so as to avoid the necessity of frequent stair descent. Care must be taken that the pipes and faucet are such as not to impregnate the water with any hurtful metallic particles.

In case the water supply is from a well or cistern outside, the greatest care must be taken to preserve it from the contamination to which the carelessness or mischief of children may expose it. The covering should be so tight as not to admit anything from the surface, and the ground so raised about it as to throw off any outside drainage. A permanent trough beneath, with a spout to carry off the water, prevents much soiling directly at the well, and is a convenience in the drawing of the water. It is not difficult to have near at hand a self-emptying wash basin, and these aid in securing cleanliness. The purity of the water can only be assured by an occasional examination. If there are special indications of foulness the well must be cleansed or the water submitted to a chemist. Some reference to ready tests will be found at the close of this article.

CONTAGIOUS DISEASES.

As a large class of diseases is especially communicable to children, it would be a natural inference that as they gather each day in masses, or come, it may be, from homes in which some are already sick by contagion, they must become the carriers and diffusers of such diseases. Careful statistics show this so largely to be the case, that school authorities recognize it. Instead of precautions to prevent it, the one sovereign remedy seems to be to disband the school. This is often unwise educationally, and indeed not promotive of general good health. It would be far better, if in case of any prevalent epidemic the trustees immediately inquired into the families under their charge, or informed themselves as to local cases of sickness such as rendered it inexpedient for other members of families to attend school, and cautioned parents not to send those in any degree unwell. A superintendent of schools in one of our counties recently told me that he visited a large school in which several of the pupils had their necks bandaged, and, in two or three instances, poulticed. On inquiry as to the cause he was told that diphtheria

was prevailing. When he heard afterward of its spread he was not in doubt as to the cause. The practical working of the contagious disease acts of Great Britain and Holland show how much can be done to prevent such a catastrophe.

RECESSES.

In the Kindergarten system, accurate observations have been made as to how long children of various ages will bear interested attention without fatigue.

Much of the cry about the evils of long school attendance and the advocacy of half-time schools, arises from an imperfect adjustment of work and play, a lack of variety in position, and a disregard of the rest to be secured by the proper variety and adjustment of studies. A child will be invigorated by mental as well as by muscular work, if only the music of its life has its rests. There is a great American tendency to work continuously for several days or weeks, or even months, and then make up for it all by a Sunday sleep or a summer vacation. The method tells badly on the general health, and even more when its influence extends to our schools. The decided inclination is to crowd all school hours between 9 and 1.

Let the child have a recess every half-hour or hour if only five minutes, a change of study and of posture, and an occasional singing or gymnastic exercise, and he will endure many hours of schooling with ease and benefit. A half day of all work and a half day of all play is often a strain and stress on the system, while an intermingling of the two, according to age and degree of effort, is not harrassing. If children are received into school so early as five years of age—which seems to us of very doubtful expediency—they need great care lest they be exhausted by over-restraint; but even here it is not so much a question of time as of method. To those older, there must be a careful adjustment between study and recreation. The bearing, too, of times of recess upon eating, is not to be overlooked. Children do not endure long fasting well, and if eating hurriedly the tax upon the digestive organs is all the more severe. A quiet meal every four hours is oftener than otherwise the rule for school children. Those who are kept at school until one and then hasten home for a hearty meal often suffer from the fast. Much of the irrita-

bility of children over their tasks the physician can trace to that exhausted vitality which arises from unintermittent exertion, delayed meals, or other unsanitary circumstances. The habits of long fasting or promiscuous eating, which are the legitimate outgrowth of the attempt to finish up the school day rapidly, is largely telling upon the health of our American people.

Such are a few of the more prominent ailments which attach to the modern school-room, and such the chief points that need to attract our attention in its hygienic management.

There are many other matters, such as exercise, mental hygiene, rewards and punishments, and the times and length of study, the best assortment of studies for healthy mental development, etc., which involve the most skillful circumspection of the phenomena of mind, and of those points of contact so frequent and intricate by which mind and body act and react on each other.

On these it is not our present plan to dilate, but only to call attention to their vast importance, their direct bearing on health as well as on mental power, and the necessity that those having the charge of children should rightly estimate the profound and weighty hygienic questions which have so important a bearing on the present progress and future welfare of the child.

It has thus been our object, first of all, to draw attention to the extent of the field of observation, and the immense interests which are concerned in the school period. A great and desirable object is attained if only we can sound to the great public the cry, Attention! There are multitudes who send their children to our public schools in such a routine way that they little think how far their entire life destiny is involved in their experiences there. Even when recognizing that they are to attend for discipline and instruction, there is little thought of the health of the body, which is to be as really moulded and decided there as the progress of the mind. But if only parents pause to think how habits of physical as well as of mental life are there formed, and that the surrounding condition of the child, just as much as the soil and locality of the plant, determine to a great degree its future, it is easy to awaken them to some sense of the interests involved. Good air, right temperature, right light, right posture, cleanliness, right drink, right surroundings, mean far more for the mental as well as bodily con-

dition of the child, than is estimated. Character and future capability for industry, thrift, sustenance are all concerned in the school period, and every citizen should feel it. One of the first remedies, therefore, for evils, is to do just what the State Board of Health is doing here—to draw the attention of the citizen to the reality and pressing necessity of these interests —to the fact that they are largely overlooked, and that to a great degree they admit of correction. The reason for not dwelling upon them more fully or with greater exactness of detail is that investigations on these matters have already been made in various countries and states, which need no new and special experiments in our own State to confirm their accuracy or their applicability to us. The mere statement of the facts ought to be enough to gain the admission from the public mind that a real importance attaches to the subject.

The minds of parents and citizens being thus drawn thereto, with the admission on their part that these interests need attention, the natural question is, What is proposed to be done in order to secure a greater avoidance of existing evils for the future?

DUTIES OF TRUSTEES.

Our first point is that the trustees of our schools need to make these matters a special subject of their own intelligent study and supervision. There is no class of perfunctory officers in our State that more need to magnify their office. They are the appointed guardians, the constituted foster-fathers of a great family of children, committed very largely to their care by the State. Their duty is not merely to learn that there is a school-house, that a teacher has been hired, and that the machine will, on a certain day in September, be put in motion, but to look after the preparative condition of this large child-family as its health wardens. We ask that they hold themselves responsible that the children whom the State, in self-protection as much as in liberality, has assembled for education shall, as far as possible, be divested of all circumstances which will in any wise tend to the least imperilling of physical health. To this end the points which we have noted, and others that experience may suggest, should be subjects of their careful guardianship, and should be attended to as a part of their obligations to the State, and to the district as well, as a token of their heart-interest in the children.

DUTIES OF EDUCATORS.

Next to these, and perhaps practically even more, must we look to the State and county officers of education. They, from their intelligence and information, and personal identification with school-interests on a broader field, may be expected to have good vision over the great field of responsibility opened up before them. The Normal School, the State Superintendent and the various County Superintendents need themselves so to be impressed with the health-interests involved in the education of children, that with the pressing enthusiasm of a far-reaching discernment, they shall push home upon trustees, teachers, all school guardians of youth, the vital necessity of intelligent appreciation of these imminent concerns, and so far as in their power see to it that they are not overlooked or slighted. It is pleasant to know that in our State such offices are generally filled by men who have shown adaptation and capability, and an enthusiastic energy in their work. Although some of them have not yet been able to magnify or enforce these considerations, we believe there is of late a new impression of the critical necessity of new advisement in these regards, which only needs to be deepened by a more thorough study of the subject.

Besides, each individual *teacher* is to be reached. The teacher himself needs a wider view of his own relation to physiology as a study. There are many already that appreciate it as a worthy part of general information, and a branch which may be vindicated for a place in the class-room. But more than this is needed for the teacher who would come to realize the intimate and integral relation of a knowledge of physiology and the laws of health. He needs this not half so much in order that he may teach it, as he needs it in order at all to comprehend his calling. The structure of a man, his physiology and modes of working, and the condition under which the whole being is to be operated in any educational process, are so vital and fundamental that he needs to realize some of this knowledge as an underlying principle in all education. The physical, the intellectual and the moral are so bound together in that composite creature we call a child, that we cannot regulate the developments of children unless we know much of the parts that make up the whole. Some knowledge of each is necessary to the proper management of

any one part. "We cannot," says Maudsley, "understand mind function without embracing in our inquiry all the bodily functions." Mental phenomena have their corporeal conditions, which must be understood physiologically. The real teacher should have studied the entire article with which he has to deal. If his idea of physiology is merely that it is a proper subject for teaching, like botany, he will merely look upon it as an interesting branch of science, and will perhaps teach some of its deductions formally. But it is not until it enters strongly into his conceptions of adequate preparation for dealing with the child at all, that he will come to grasp it with his whole head and his whole heart. A recognition of it as fundamental to all questions of education is needed in order even to give full force to that special department of only one of the parts of physiology known as hygiene.

Thus the teacher will be prepared to estimate the statement when we say that the care of all things that relate to the hygiene of the child or his sanitary surroundings is a part of his occupation. Now-a-days is there not too much of the feeling among teachers, and of the permission of such a feeling by his employers, that he is hired for a few hours each day merely to direct the intellectual development of the child? We take a far broader view of his high professional and official relationship. He is put in charge of a body of youth, in the interests of the State, for the purpose of doing his utmost to make of them such material as will be available for its growth and prosperity. The oversight of the parent and the training of the citizen is for no inconsiderable time transferred to the teacher. To look after the ventilation and temperature and moisture of the room, to secure cleanliness on the part of the pupils, to see that the building and its surroundings are healthful, and that the scholar has secured to him the best conditions of progress, is far more intrinsic to his work than a lesson in geography or a trial of the spelling class.

The three essentials for the teacher in this regard are, (*a*) that he should himself have a fundamental and practical recognition of the subject; (*b*) that he should know existing evils and the most efficient remedies; and (*c*) that he should appreciate his own official responsibility. He must not compliment himself as doing gratuitous and philanthropic work, but know himself de-

fective as a teacher unless in such matters he conserves the highest interest of the wards under his charge, not less than in recitations.

The next condition of success in abating or preventing school evils is to have (*a*) such arrangements as shall permit the full application of the best known laws of health for school; (*b*) the ability to remedy known defects, and (*c*) such tests or knowledge as shall make it possible to acquaint himself with the actual embarrassments.

The first (*a*) necessitates the right choice of building ground, the right construction of the building and all those conditions which favor the best administration. These need not be specified here, but as it is much easier to construct aright than to amend, all these should be carefully understood by those who plan, and even by others, in order that they may know wherein their own prearranged buildings and methods are defective.

(*b*) Defects being known the remedies are such as will most nearly conform to what should have been or to those arrangements and conveniences which are granted to be desirable.

The third (*c*) necessitates a knowledge of the evidences of defect and the ability, if need be, to resort to those expert tests which manipulative science furnishes.

As affording some aid, it may be well for us here to recapitulate some of the best understood principles of management and of avoidance of evils, and to record such tests of defect as are of ready application.

These will not be exhaustive or complete, but will aim to present the best settled views of those who have given large attention to these great interests.

EYE DISEASES, AND HOW TO AVOID THEIR INCREASE IN SCHOOLS.

Have no windows in front of the scholar. Secure as much light as possible from above the level of desks. Outside cornices and near proximity of other buildings should not cast a shade or interfere with the light. The space around should bear proportion to the size and the height of the building and to the height of adjacent buildings, and the size of the windows should be from one-fifth to one-sixth of the floor space, (Cohn, Lincoln, etc.): Burnett insists on one-fourth. So a room twenty feet square

should have about twenty square feet of glass. If the building has its corners pointing to the cardinal points of the compass some advantage is gained as to the direct rays of the sun. (Olmsted.) Gray or blue tints are best for the inside walls and trimmings. Some advocate green, but yellow rays incline to mingle with the green and these are objectionable.

It is better to have the light coming from behind and next best from the left side. For this reason some advocate only left windows for school rooms. But the matter of ventilation is also to be considered. Lincoln sums up the best sustained view, as follows: "Windows on the right are slightly objectionable, as throwing a shadow on the page whenever the hand is used in ciphering, drawing and writing. Windows at the back throw the pupil's own shadow on his book, but this is not a serious matter, except for those who sit next a window, and they have light enough at any rate, while for writing they are extremely well placed as it is usual to turn partly to the left in this exercise. Windows at the left are entirely free from objection, as far as they can be free. The ideal light should come from over the left shoulder, or the right shoulder if one is sitting up and reading, but if looking over a desk this is rather inconvenient, and the best is then a very high light from the left and a little to the front. In brief, the rule for placing windows is *never* in front, *always* on the left; at the back, also, if you choose, but not at the right, if you can help it."

The child standing at the blackboard should never face the light. Blackboards between side windows should be dispensed with, unless the blinds are closed on the side used.

Not only is a squint or cast in the eye often remedied or prevented by proper light, as is shown in Donder's method of curing it by adapted spectacles, but short-sightedness (myopia) is caused or aggravated by studying with improper light, as is also that long-sightedness, which tires with the book or writing at a usual distance.

Indeed, the fatigue, the pain of the forehead, and often slight temporary squint show how the eye is being overtaxed.

SEATS AND DESKS.

Floor space is needed, not only for these, but for ventilation. The average should be not less than 25 cubic feet for each scholar.

A good rule as to the relative height of seats and desks is, "that the desks should be of such a height that the elbows may rest upon them, when the body is erect, without any displacement of the shoulders."

A straight back, or lightly curved at the top, is most available, and, unless coming to the middle of the shoulder blade, should not be high enough to touch its lowest angle.

The desk should usually slant about 30 degrees, but may be made adjustable so as to be accommodated to reading, writing and position.

The distance between the seat and desk will need to be accommodated somewhat to the size of the scholars, but should nearly enable the child to fill the seat while leaning forward. Other points have been already noticed. As desks and seats are exposed to much soiling, they should be made of hard wood, treated with hot linseed oil and varnished, so as to admit of easy cleansing.

All shelves should admit of removal for cleansing, and even ink wells should hold by the rim, so that there be no dust bins beneath them.

THE HEATING OF SCHOOL ROOMS.

The evils to be guarded are excessive heat, excessive dryness, excessive cold, too sudden variations of temperature, too much dust from the heating apparatus, hurtful gases from the heater.

(*a*) For excessive heat or cold, or too sudden variations of temperature, the thermometer is the ready test. There should be in each school room not less than two thermometers, about equidistant from the centre of heat, and the furthest point in the room. One of these should be about half-way between the floor and the ceiling, and the other about one foot from the floor. Where rooms are larger, and the points from which the heat is derived are more numerous, more thermometers are required. These are inexpensive, and in information to the pupils and regulation of the temperature, will well repay the outlay. It should be the duty of the teacher to register at the opening of the school, at the close of its morning session, and in the middle of the afternoon session, the thermometer records, and to have these

for the inspection of the trustees at their meetings. 68° (F.) is about the desirable average here, but variations from 66° to 72° are within the range fitted for the majority.

(*b*) Excessive dryness of atmosphere.

The usual wet and dry bulb thermometer, used by the meteorologists, is the most reliable test of this, and will do in place of one of the others. The reading of the dry bulb is the same as that of the wet bulb.

The most healthy state of the atmosphere can be obtained when the dew point of the air is not less than 10°, or more than 20°F. lower than the temperature of the room, and can be easily familiarized by the teacher.

"The dew point is that temperature when the air is just saturated with moisture, so that the least further fall would cause a deposit of water. * * What the thermometer indicates this to be is the dew point. When not thus saturated, the temperature of the dry bulb is above that of the wet bulb, and both, of course, above the dew point. The temperature greatly affects the amount of moisture, yet whatever the moisture may be, the lungs are giving off air nearly saturated. In a cold morning the watery vapor of the breath shows itself, and what is given off by the lungs and skin exceeds that by the urine. If there is excessive moisture with high temperature, we are oppressed with heat out of proportion to the registry of the dry thermometer, for evaporation is interfered with. If, on the other hand, there is great heat with undue dryness, evaporation from the lungs, skin, etc., goes on too rapidly.

"The air in the school-room should be three-fourths saturated with watery vapor. The best way to test the degree of moisture is to suspend two thermometers side by side, one in the usual condition, the other with a bulb covered with a thin piece of cotton cloth, kept constantly moist by dipping a portion of the cotton in a suspended cup of pure water. The difference in temperature between the wet bulb and dry bulb thermometer will indicate the relative dryness of the air. Thus, if the dry bulb marks 65° and the wet bulb marks 60° the air is exactly three-fourths saturated, and the difference between the wet and dry bulb thermometers should not exceed 5° in any school room."

A simple contrivance for testing moisture is one suggested to me in a note from Prof. Kedzie, of Lansing, Michigan. "Write a

sentence with chloride of cobalt on white paper, using a little glycerine to keep the writing in a moist condition if the air is not too dry. When moderately moist, the chloride of cobalt is in a hydrated form, and is then pinkish but not strongly colored, and the writing is nearly invisible. In a very dry air the chloride becomes anhydrous and is deep blue, and becomes visible all over the room, especially if written with a camel's hair brush to make a broad mark." I have a single specimen sent me six months since which always, on being heated a little, becomes blue, but breathing upon it the blue soon disappears.

Even a hair as used in the hair hygrometer, by the changes on the dial plate, shows how decided is the effect of varying degrees of moisture. It marks the degree of humidity quicker than do the dry and wet bulbs.

In the school-room the almost universal registry, during the period of artificial heating, is that of too great dryness.

The remedy is to provide water for evaporation, not only in the furnace, or by warm water placed on the stove close enough to the fire to secure evaporation, but also by tin hot water holders inside of such registers as pass the hottest air.

Baked and dried air is very different from the outside air meant for breathing. Attention to this moistening of the air is indicated even where it is not thus tested each day. "For temperatures between 60° and 70° Fah., if we moisten the air we may reduce, by several degrees, the temperature without suffering discomfort."—(*Winsor*.)

Chilliness may denote dryness of air rather than a low registry of the thermometer.

"One result of the poisoning of the blood by impurity of air is the extreme susceptibility of the system to cold."

In the summer, it must be remembered also that the temperature of the school room and the humidity of the air are affected by exposure, by draughts and by proper *housekeeping*. The care of the janitor between school hours, as to airing, as to closing against direct rays of the sun and giving it the full advantage of night cooling, are all important. During school hours, too, the parts exposed to the sun should be shaded by the blinds and draughts secured in the best directions. While we may not regulate outside temperature, we find that the inside temperature of houses during the absence of artificial heat is greatly

varied by modes of construction, by airing, by regulation of light and of sun rays, and by the various devices or neglects of high graded and degraded housekeeping.

As dust and hurtful gases from the heating apparatus make a contamination of air, which naturally associates itself with dust and foul gases from other causes, these will be fully considered under the head of

VENTILATION.

The chief call for this in school rooms arises from,

(*a*) Stagnation or imperfect motion of air.

(*b*) Carbonic acid gas accumulated from breathing, from stoves and lights, etc.

(*c*) Other gases from overheated stoves, or from decay of organic matter, as furnished by the individual and his surroundings.

(*d*) Dust and organic particles of various kinds floating in the air.

Imperfect motion of air may be caused by the state of the atmosphere, or by conditions incident to the room in which the pupils are congregated. The chief difficulties arise from overcrowding, from imperfect provision for that circulation of air which takes place in the open and from the production in the room of those defilements of air which make its more rapid change desirable. The indication is to prevent as far as practicable all contamination of the air and then secure for it the greatest freedom of motion compatible with freedom from undue draft. Air may move at the rate of about two feet per second without perceptible motion or draught. Happily, even this velocity is not needed for ventilating purposes under usual conditions. It may be increased where extreme heat or moisture or other embarrassments render the air more stifling than ordinary.

A small instrument known as an *anemometer* measures the velocity of the currents of air. Casella's small air meter answers a similar purpose.

The revolving paper mills of children, or a light feather will often indicate the direction of air currents. These practical lessons in philosopy, in the hands of a good teacher, are a part of education as well as some of the instructions in natural

philosophy contained in the text books, and are fully as interesting as well as of immediate practical service. A thermometer in the line of a draught will show a degree of heat much less than one quite near it, not thus exposed.

To secure proper change of air various methods are devised. Some trust entirely to the windows, which according to the etymology given by some, were so called because found of service as wind doors. Windows ventilate best when slightly lowered from the top and raised from the bottom.

In other cases chimneys are made available, especially when occupied by fires. For summer and early fall ventilation these are of much service, and their flues may have connection with the school rooms which are easily regulated. A downward draft is easily detected by a lighted match or taper, and where there is need of an upward draft not found, the heat from a kerosene lamp or a gas jet, properly adjusted, is sufficient to move the body of cold air in the shaft.

Sometimes a shaft is provided through a building connecting with a louvre window or cupola upon the ridge of the roof by which an upper current is secured and rapidity of current increased.

These are ordinary resorts available in connection with what is known as natural ventilation.

There are besides two methods of artificial movement of air. In the one known as the plenum or propulsion method, by means of a fan or other contrivance, air is driven into rooms in imitation of a breeze, and is sought to be regulated in its introduction by various arts and appliances.

If this air thus propelled can be so atomized as to enter without sensible currents, you secure a regulated flow.

The other is that known as the aspiration, vacuum, suction, or exhaustion method.

Instead of pushing out air by driving in new air, and so making circulation, it pulls out air, and thus causes other air to rush in its place, and so currents are caused.

Sometimes the one method is applied to the introduction of pure air, and the other to the removal of the fouled air, or they are interchanged in other ways.

We can not here discuss the various methods and appliances of artificial motion of air, but only allude to them here in order

that by an outline of the principles involved, when used in our schools, those employing them should recognize that, in order to succeed in a hygienic sense, they must be carefully regulated. At present we think we may say that the introduction of air, by some method of propulsion, in cases where more than natural ventilation is needed, is more generally applicable.

CARBONIC ACID AS A POLLUTION OF AIR.

Our next inquiry is as to the evidences of the presence of carbonic acid gas, accumulated from breathing, from stoves, lights, etc.

The degree to which this needs guarding is apparent from the fact that while a cubic foot of pure air does not contain more than a cubic inch of carbonic acid gas, a cubic foot of air given out by the breathing contains seventy cubic inches of this gas. So one person in a tight place containing 56 cubic feet of pure air would, by his breathing alone, bring up its amount of carbonic acid to one per cent. To this must be added the amount occurring from the decayed particles always being given off by the lungs, the skin, and from various suspended particles undergoing decay in the atmosphere. Beside, if there is fire or light, every cubic foot of coal gas adds two cubic feet of carbonic acid and takes away ten of oxygen.

Three hundred and fifty cubic feet of air may be stated as an average of the amount needed each twenty-four hours. As we are thus constantly befouling the air of a room by our own breathing, and by organic particles, combustion, etc., in order that the amount of carbonic acid shall be kept at from 1-10th to 1-6th of one per cent., 2,000 cubic feet of air must be admitted each hour for each person. Practically we know that we cannot move the entire air in a room oftener than three times per hour without draught. On this basis about 650 feet of air is needed for one person; but the amount theoretically needed is modified by the shape of the room, by the fact that it is not air-tight, and that rooms themselves greatly vary as to their perviousness and other modes of ingress and egress of air. Thus the reckoning is often found extravagant for the open sitting room and inadequate for the close jail, the hospital, or the crowded soldiers' barrack. School-rooms occupy an intermediate place, and tests

already noted show that they are generally too confined. We therefore take the general guiding facts, and test their variations by actual experiment.

The most available test is that given by Dr. Angus Smith, which is varied in details by some experimenters. The direction is: Let us keep our rooms so that the air gives no precipitate when a ten-and-a-half ounce bottle full (*i. e.*, of air,) is shaken with half an ounce of clear lime water. Prof. Kedzie puts it thus:

To test whether air does not contain more than 8 parts of carbonic acid in 10,000 of air, fill an eight ounce vial with pure water (rain water). Empty out the water in or amid the air you wish to test; the vial will then be filled with the air of the room. Pour into the vial half an ounce of clear lime water and shake thoroughly. If it remains perfectly transparent, without any trace of milkiness or turbidity, it does not contain more than 8 parts of carbonic acid in 10,000.

Prof. H. B. Cornwell states it more fully, thus: "Shake burnt lime in a bottle with water, and allow it to settle clear. (You thus have fresh lime water.) Clean a very wide-mouthed bottle inside with a linen cloth, exhaust the air by suction through a tube, with great care not to breathe into the bottle, which would have to be cleaned again. Pour in one half-ounce of clear lime water and shake well. If the air contains not more than the percentages of carbonic acid below, and the sized bottles there given are used, no turbidity will ensue from the carbonate of lime."

Table to be used when the point of observation is "No Precipitate:"

20.63 oz., avoirdupois, bottle will have no precipitate if the carbonic acid is				0.039
15.60 oz., avoir., bottle, if it is only				0.040
12.58	"	"	"	0.050
11.57	"	"	"	0.060
9.13	"	"	"	0.070
8.05	"	"	"	0.080
7.21	"	"	"	0.090
6.54	"	"	"	0.100
6.00	"	"	"	0.110
5.53	"	"	"	0.120

5.15 oz., avoir., bottle, if it is only				0.130
4.82	"	"	"	0.140
4.53	"	"	"	0.150
3.52	"	"	"	0.200
2.92	"	"	"	0.250
2.51	"	"	"	0.300
2.01	"	"	"	0.400
1.71	"	"	"	0.500
1.51	"	"	"	0 600
1.10	"	"	"	1.000

In other words, as instances from our table, a bottle holding eight and a half ounces of air, with a half ounce of lime water shaken in it, would show no precipitate or turbidity if the amount of carbonic acid was not more than .08, i. e. eight parts of carbonic acid in 10,000 of the air in the room and bottle.

If a six ounce bottle is used, with the same amount of lime water, there might be .11 parts of carbonic acid to 10,000 of air, and yet there would be no turbidity; or if a two-ounce bottle was used there might be forty parts of carbonic acid to 10,000 of the air, and yet no turbidity ensue.

Now if a bottle of eight ounces, with a half ounce of clear lime water, gives turbidity, you know that there is more carbonic acid in the air than is regarded as desirable for a school room.

If a six ounce bottle, with a half ounce of lime water, gives turbidity, you will know that there is more than eleven parts of carbonic acid to 10,000, which is an excess.

If a two ounce bottle should give turbidity you then know that there are over forty parts of carbonic acid to 10,000, while there should be not much over eight parts to 10,000.

By testing with different sized bottles, after you have once found turbidity, you will be able to find out nearly the proportion of carbonic acid.

Although carbonic acid, in moderate excess over the amount found in the open air, is not so actively poisonous as some imagine, yet as displacing or substituting oxygen, and as poisonous when in large excess, its quantity needs watching. Our breaths furnish it, our heating and lighting appliances furnish it, and it is one of the gases of that decomposition or decay which is con-

stantly going on where organic particles are separated from their vitalized relationship.

So it is more apt to be excessive in quantity in close or heated rooms than are most productions of decay, combustion and change. Even beyond its own evil import, when it is present in excess it affords an approximate criterion of the deterioration of the air in other and worse regards.

Yet where there are special sources of contamination, as from bad surroundings, super-heated air, ill clothing, untidy habits, or unhealthy persons, the carbonic acid is not the full test. There are vitiations of air of which it can not be the measure. Ammonia, sulphuric acid, sulphuretted hydrogen, sulphide of ammonia, some of the nitrogen compounds, some of the acids formed by the oxidation of oleic acid, with nitric acid, some undefined gases, such as sewer gas, and various volatile excretions from the lungs and skins of animals, also contaminate the air or in their oxidation burn out its chief vitalizer.

Of these the excess of carbonic acid is not a very accurate test, although leading to suspicion as very likely to have them in company when found largely amid animal existence. Often the quantity from a lime kiln would not injure, while the same amount in school air would betoken a presence of other gases which are doing the most of the real harm.

Ammonia may be detected by the logwood paper. "Tincture of logwood is evaporated to dryness and the residue *dissolved* in ether; strips of filtering paper are dipped in it, to which ammonia gives a brownish color." Sulphuretted hydrogen is best detected by exposing strips of blotting paper dipped in a solution of acetate of lead.

Ammonia sulphide is detected by paper dipped in a solution of nitro-prusside of sodium.—(*Parkes.*)

The entire absence of ozone, or its speedy destruction when generated, generally betokens much organic matter, which is rapidly oxidized by this agent. The presence of ozone may be tested by Houzeau's test. "Expose litmus paper of a neutral tint soaked in a dilute solution of iodide of potassium; the potash set free by the action of the ozone turns the paper blue. The same paper, without iodide, would indicate the extent to which the effect might be due to ammonia vapor."

Both in this country and England patent ozone generators are in

use, which regulate the burning of phosphorus by which ozone, or negative oxygen, is produced. As ozone is a ready oxidizer of organic matter, and is in the state of a gas, it seems specially fitted for the removal of gases of decay from indoor atmosphere, while free ventilation both neutralizes and dispels organic matter. We believe that ozone may yet become a valuable aid in purifying crowded school-rooms during the hours of occupancy.

HEAT, AS A SOURCE OF HURTFUL GASES.

During a large portion of the school year in our climate, as we are dependent upon artificial heat, the maintenance of the purity of the air is much complicated thereby. Besides heat itself is the great factor in the regulation of currents, and so of ventilation. Artificial heat is very liable to introduce gases which deteriorate air, and so comes to be a source of contamination in common with other allied sources of befoulment. Our effort with artificial heating should be to furnish just for breathing what is furnished out of doors when the atmosphere is warmed by the sun. Our imitations are not very successful, as they become more artificial.

In combustion carbonic acid is, of course, always produced, and besides, from the nature of the heating material now generally used, and from the often imperfect combustion carried on by artificial apparatus, we get various gaseous and acid sulphur compounds, etc. While in a perfect system of heating these would all find their way through the smoke flue, yet with impeded or red-hot combustion, imperfect metal and imperfect joinings of parts, very much often escapes into the rooms.

The odor is detected, the stifling felt, or if not, the house plants, the books and the furniture in due time register the effects.

Sulphuretted hydrogen, sulphurous and sulphuric acid, and carbonic oxide are not unfrequently to be detected by chemical tests in the heated air. More recently special attention has been called to carbonic oxide, which contains one more equivalent of carbon than the carbonic dioxide generally known as carbonic acid gas. It is far more deleterious than the latter. Less than one-half per cent. has produced poisonous symptoms, and in charcoal suffocation more of the effect is due to it than to the

carbonic acid. It increases in quantity when fuel is burned with an inadequate supply of pure air.

It is very apt to be generated when anthracite coal heats cast iron cylinders to a red heat. Even wrought iron stoves, when overheated, will pass much of it out through imperfect joinings. The contact of the air with the over-heated metal seems also to deprive it of much of its oxygen.

Much of the weariness, headache and oppression arises from such air by heat diminished in its oxygen, by ill conducted combustion laden with carbonic oxide and various deleterious gases, and from the dryness produced by superheated air.

According to Prof. Böttcher, strips of linen or cotton soaked in a concentrated solution of chloride of palladium, as free from acid as possible, assumes a very black color when brought in contact with carbonic oxide.

The value of sensations as a test is not to be overlooked in close and wrongly heated rooms. Children, and especially those at home used to a pure air, are available and sensitive tests of impurities. When many complain of headaches, closeness of air, depression and discomfort, it is quite likely that something more than carbonic acid is the cause, and that organic matter or carbonic oxide, or some of the gases of decay, are present.

Scrupulous and enforced cleanliness of person is also of great importance for schools, as excretions from the skin and the soiling of clothing are equally contaminating with outbreathings and surroundings.

DUST AND ORGANIC PARTICLES IN AIR.

Dust and organic particles, derived from other sources than those mentioned, besides their tendency to decomposition, inflict evil by mechanical irritation. An examination of the minute particles in public buildings in New York City, revealed a considerable amount of fine powder of horse manure. Pollen and particles of various kinds are not unfrequently found mingled with the air, especially when it is very dry.

These are to be detected by sunbeams, by the microscope, and by optical experiments such as those of Tyndall in his recent lectures in this country. Under the British houses of Parliament they have an admirable arrangement by which all the air

is strained and moistened. The deposit left upon the dampened hemp or cloth is quite convincing as to the need of such a device.

In school rooms it is of especial importance that sweeping and dusting be done with care, for if there is much dust to raise it is pretty certain to be raised. The furnaces often add dust through the registers, some of which might be retained by moistened coverings frequently changed.

Dry cleansing of the walls and ceilings should be occasionally attended to, even during term time. There can be no doubt but that the application of lime-wash to the wall above the wainscoting, once or twice on Saturdays during term time, in very crowded schools, is of service.

It is thus evident that neither the scientific laws as to air nor artificial arrangements are entirely sufficient. We need to understand the general requisites, the sources of befoulment, the methods of test, and then to exercise that watchfulness without which most methods fail, and with which science and art now afford us sufficient aids to secure successful results. These none need more to know and apply than our school authorities, and with no class of interests in regard thereto is our State more identified than with that of its children and wards in its public schools.

WATER SUPPLY.

Having already alluded to the kind of water supply desirable, it only remains here to notice the easy tests which may indicate its condition, or which may lead to such suspicion as to call for laboratory investigation.

Water which tastes or smells badly or is turbid, is always suspicious, and either to be tested or refused. If organic matter is present a few drops of permanganate of potassium added will give a red color, which will quickly disappear. The water should be at a temperature of about 140° F., to make the test more satisfactory. The solution of permanganate of potassium becomes brown or turbid in contact with suspended or dissolved organic matter. "If water acts greatly and rapidly on potassic permanganate, nitrates or sulphuretted hydrogen will probably be found; if not, the rapid action is from organic matter which

is decomposing; probably animal, as vegetable matter acts more slowly."

A closer test as to appearance and taste is to put the water in a close flask or long bottle at ordinary temperature. It should still after a few hours be clear and colorless, and when shaken give no offensive smell.

It is important to know whether much chlorine is present in water, for although a little salt may be the innocent cause, yet as chlorides increase in proportion "as a water is contaminated by sewage, any unusual amount of chlorine is suspicious." Ordinarily 1 to 2.3 grains of chlorine per gallon is all that should be present.

Prof. H. B. Cornwell, E. M., of Princeton, kindly gives me the following method:

Procure a wide-mouthed bottle of clear, white glass, holding 5 ounces up to a certain mark. Put into it 5 ounces of the water to be tested, and add enough pure chromate of potash to give when dissolved a distinct, clear, yellow color. Get the druggist to weigh out for you 15 grains of crystallized nitrate of silver, and dissolve this in 16 ounces of rain water, caught after several hours of hard rain, in a clean vessel. (Distilled water is better.)

Some means of measuring out small quantities of this nitrate of silver solution will be required. A graduated *minim* measure, as used by druggists, will serve very well; if this cannot be procured, a homeopathic vial holding a drachm (one teaspoonful) may be graduated into quarters, or even sixths, by marks scratched on the outside with a file, and will then do very well.

To the five ounces of the well water to be tested, containing the chromate of potash, add from the graduated measure, with constant stirring with a glass rod, just enough of the nitrate of silver solution to produce a *permanent* reddish tint. A reddish orange color is deep enough.

Try the same experiment with two or three well waters, which, from their location and qualities, may be presumed to be free from sewage or similar contamination, and if it is found that the well water first tested requires half as much again of the silver solution, or twice as much, or possibly even more, to produce the reddish tinge, it certainly contains more chlorine than

the soil ought to yield and may be suspected of sewage contamination.

As regards using the homeopathic vial for a measure, considerable accuracy may be obtained by making first a rough experiment, and then a more careful one on a second portion of each well water, taking the precaution this second time to add the last quarter or half vialful of the silver solution (found to be necessary by the rough experiment) drop by drop, until the permanent reddish tint is produced.

It is best to set the bottle holding the water to be tested on a piece of white paper, and to rinse it thoroughly, before making the test, with some of the water to be tested. It is best not to make the test immediately after a heavy fall of rain. The silver solution will make an indelible stain on clothing. The reddish coating formed in the bottle used for testing the well water, after several experiments, is easily removed by nitric acid, as also the blackish stain that may be formed on the measuring vial. The nitric acid must, however, be very thoroughly removed by rinsing with rain water.

The silver solution should be freshly prepared, or if kept a very little time should be protected from the light. Water near the sea naturally contains more chlorine than that of mountain districts, but in most cases the test is informing, where there is no unusual addition of common salt or other chlorides to the soil.

Such are the principal matters to which in considering the care of children in the home and the school, it has seemed proper for us to invite executive attention, and, through you, the thoughtful consideration of the parents, teachers and guardians of our State free school system. The building of a body is as important as the building of a brain. If only we can help to impress all with the urgency of the need to guard carefully these school-room conditions, it is our hope that in the future we may aid in devising plans of improvement, and in suggesting such scientific and practical tests as will not leave us in doubt either as to real conditions or methods to be adopted for securing alleviation of existing evils. Our hope is thus to co-operate with those who are endeavoring by a free education to make each child fit for such life-work as shall bring happiness and prosperity to the people and thus confer a blessing on the State.

Domestic Hygiene.

BY J. M. RIDGE, OF CAMDEN.

The great and transcendent necessity of having pure air, pure water and pure food in the house, will be admitted by all candid persons. For if these, which are the chief sources which maintain life, are contaminated, then the citadel of life is in great danger of destruction. But to come at once to the more practical details of the subject. What are the avenues by which these stealthy foes, the germs of avoidable disease, enter to surprise and sap the citadel of life? The same as those through which the supplies for its garrison are introduced. The nostrils, into which benignant Deity once breathed the breath of life, are too often the conduits for the miasma of death, and the bread, which should be the staff of life, proves but a broken—even a poisoned—reed, piercing with a deadly wound the bosom that unsuspectingly leans on it for support. The object of the hygienist, then, is to convince the people of the absolute necessity for pure air, wholesome food, and healthful beverage to bodily vigor and length of days; to make them understand that to neglect to ensure these is to disregard the claims of laws as inexorable as those of gravitation; that when the head of the household, in the full vigor of manly maturity, or the darling of the family, in the early bloom of perfect health, is suddenly snatched away by the grim destroyer, it is no more the part of piety than it is of wisdom to prate with folded arms of the mysterious dispensations of Divine Providence, and urge submission to His will. This is but to charge the results of our own stupidity and neglect upon our Maker, or as another has forcibly expressed it, "to flout our filth in the face of Deity." Preventable disease, which it may be fondly hoped will one day include all disease, may indeed be a scourge in the hand of the Almighty, but it is for the infraction of those of his laws which are written in the book of nature, not of revelation. The book of revelation does

indeed contain a hygienic, as well as a moral code, so comprehensive and searching in its conception as to indicate Divinity as its originator, and so clear and practical in its details that, were it studied with one-tenth part the devotion which is bestowed upon other portions of the book, and were an honest effort then made by Christian nations to live up to its strict regimen, we might almost look for a renewal of the forty years miracle of the desert in the complete stamping out of all disease. And the key note of this admirable system is *Purity*—purity of air, purity of food, purity of water, purity of clothing, purity of habitation, purity of person, purity of life. Beyond this we shall never get as a foundation principle for sanitary science. The hygienist will, however, but half have done his duty when he has educated the public conscience up to the highest pitch of sensitiveness to the sin of uncleanliness. He must also show how it is to be avoided. To this end he must summon to his aid the chemist, both the detector and destroyer of impurities in whatever element of nutrition they may exist; the geologist, whose practiced eye reads upon the surface the occult conditions beneath, which may generate disease; the engineer, without whose aid he will make but sorry work in his efforts to remove those accumulations of filth, which he so well knows to be the hot-beds of pestilence; and the architect, in whom we must put our trust for an air as pure within our homes, our churches, our concert halls and our schools as that which sweeps, laden with health, over the beautiful and odorous hills. And now we come to the consideration of pure air, in our dwellings, as one of the necessary conditions to domestic happiness and health.

Pure air, according to the numerous analyses of Dr. Angus Smith, is composed of 20.99 per cent., by volume, of oxygen, .033 per cent. of carbonic acid, and the rest of nitrogen, watery vapor and traces of ammonia. We shall now direct our efforts to the pointing out of the means by which the air in our dwellings may become polluted, and also those by which it may be preserved in its purity We change and pollute the air within our houses in two ways: 1. By admixture of substances which were not in the air when it came to us; and, 2. By changing its normal composition.

Both are unavoidable, but there are limits which must not be overstepped.

The impurities may be in the nature of gases or dust. We often become aware of them by our senses, by sight, by taste, but mostly by smell. The last sense is exceedingly sensitive for many substances; for instance, traces of ethereal oils. Nothing is more wonderful than its acuteness in some savages and animals. If we consider the minuteness of the substances left by hunted game on the soil, which it scarcely touches in its flight, and how the dog detects them even a long time after, we cannot sufficiently admire this acuteness of the sense of smell.

Other substances make themselves known in other ways, sometimes by some physiological effect. Oxide of carbon, for instance—a gas which is generated from burning charcoal—is not perceived by any of our senses, but if it is present in air to the extent of a half per cent. only it destroys human life after awhile.

Other substances again, as the products of distillation of fats, or the smoke of wood, irritate the membranes of the eyes. Other vapors and kinds of dust act on the taste; for instance, aloe-powder, etc., etc.

We rightly consider all air which acts on our senses or our feelings differently from air in the open, to be polluted.

The second way in which we render air impure on its journey through our houses is that of altering the quantities of its components. We deprive it of oxygen by our respiration, by the burning of lights and fires; we increase its carbonic acid and its water by the activity of our lungs and skin, and by numerous proceedings of the household.

All these pollutions and alterations are partly avoidable, partly unavoidable. Among the latter are those by our lungs and skin, because we cannot live without producing them. To the former belongs everything that from a want of cleanliness, careless treatment of waste and refuse, passes into the air-current. It is an inexcusable waste of ventilation, if it is directed against avoidable pollutions of the air. If I had a nuisance in my room I should be very silly if I kept it there and trusted to stronger ventilation. The rational way is to do away with the pollutions, not to keep them and to fight them by ventilation.

Without strict cleanliness in a house or public institution, all contrivances for ventilation will not do much good. The proper domain of ventilation begins when cleanliness, by rapid removal

or careful shutting off o air-polluting substances, has done its best. It is only against the deterioration of the air by respiration and perspiration, which is beyond the control of cleanliness, that ventilation can direct its power, and against this deterioration this power must be chiefly directed.

A series of examinations has resulted in the conviction that one volume of carbonic acid in 1,000 volumes of room air is the extremest limit which divides good from bad air. This is generally adopted and practically proved, provided always that man is the only source of carbonic acid in the space in question. And it has also been ascertained, by careful examination, that the quantity of air necessary to maintain man in a healthy condition, is 2,100 cubic feet per hour.

In the city of Camden and vicinity, so far as we have been able to observe, there is no system of ventilation attached to the private dwellings, and, therefore, the external air makes its ingress and egress through the doors and windows of the houses. Necessarily under such conditions the air of the dwelling houses must be more or less impure. In some instances we have found that the privies which are located in some of the houses, owing to the imperfect closure of their valves, admit foul air from the culverts into the houses to the great annoyance of the family, and, in a few cases we believe that typhoid fever has resulted therefrom. It is therefor, better never to have privies within the dwelling houses. Also, a very prevalent custom in our neighborhoood is to close the windows and doors against the free admission of light which is as necessary to health in the house as good ventilation by pure air. We would, therefore, say to those who are fearful of the discoloration of their carpets and warping of their furniture that it would be better to cover their carpets and furniture, and thereby protect them from the light, but by all means to admit freely into their dwellings the *pure* and *harmless* sunbeams of heaven, which are so necessary to the maintenance of good health.

Another bad custom which has come under our observation not unfrequently, is that of using bed clothing which has been in contact with persons having contagious diseases—such as typhoid fever, typhus fever, diphtheria, scarlet fever, small pox, etc., etc. In some of the more virulent of these diseases it would be *far better* to burn the clothing rather than run the risk of using

it again, even after a thorough boiling and use of disinfectants. The case we will mention shows the dangers of this custom, as we believe. A little boy about 16 years old was affected with typhus fever in this city. We were summoned to attend him. We had him put in the third story of the house, in care of a good nurse. The family was not permitted to go to, nor remain in his room, but merely to send articles of food, etc., thereto. After he recovered we ordered the clothing burned, which, it appeared afterwards, was not done, but it was packed away in the garret, after being merely washed and dried.

The family moved out of the house in which the disease occurred into another some three or four squares away, and in the following winter the bed-clothing which was on the boy's bed was unpacked and used. Very soon after that, typhus fever broke out in the family in the most virulent manner, and did not cease until three members thereof had fallen victims to its ravages.

This case clearly indicates that all clothing which has been in contact with contagious diseases should be thoroughly disinfected, if possible, or burned.

In this connection we would commend to the attention of our citizens a system of ventilation which may be applied to both public and private buildings.

Whilst general hygienic laws attempt to protect the purity of the external air from vitiation, we must also secure free admission of it into our houses, and provide means for its escape as soon as it becomes unfit for use. This constitutes the science of ventilation, in which much is yet to be learned. In suoh a climate as ours it is necessarily associated with the subject of artificial heat. The old idea of ventilation was to admit fresh air at a low level into the room, and allow it to escape at a high level. This, however, was found to be very wasteful of heat, especially when the source of heat was a hot air flue; as the warm air on entering, immediately by virtue of its rarefaction, ascended to the ceiling and then escaped through the ventilating aperture, without having warmed the apartment, and leaving the air, which did not lie directly in the path of its current, cold and stagnant. Sanitarians, therefore, have been led to think that, both for efficient renewal of air and for economy of heat, the

true plan is to have the foul air escape near the floor, as it is in that most effective of all ventilators, *the old-fashioned open fireplace.*

In order to ensure this result in houses heated by warm air flues, a very ingenious device has been brought forward by a well-known citizen of Germantown, Mr. George R. Barker, which has so far met the approval of scientific men in Philadelphia, that it has been introduced into all the new buildings of the university, a practical endorsement which makes anything beyond a simple demonstration of its design quite unnecessary at this time. At about the level of the floor of the apartment which it is proposed to heat, the masonry hot-air shaft in the chimney is hermetically surmounted by a cylindrical tin or iron flue, somewhat diminished in diameter from the lower end for a short distance up, in order to leave a considerable space between it and the original flue walls, and curving over so as to discharge its contents horizontally into the room.

Immediately below its open mouth, terminating in a register, another register, entirely separate, although for the sake of beauty made in one piece with the first, opens into the primary flue. Now, what follows the entrance into the room of hot air from the supplementary flue? Simply this, that the warm air rises to the ceiling, becomes chilled, falls, and is distributed through the room, and finally, forced by the incoming stream of warm air, seeks an exit. This it discovers at the second register immediately below where it entered, having made the complete circuit of the room, given up its heat, and taken in return whatever of impurity it could come in contact with, of a portable or diffusible character. Here it finds the necessary element for ascension, namely, a heated flue, and readily passes out and up. A most complete circulation of the air of the apartments is thus secured, and at the same the heat is all utilized.

Before we conclude this part of our subject, we will notice that attempts have been made from time immemorial to preserve the air of the sick room from contamination through unwholesome, offensive or contagious emanations from the persons and excretions of the patient, by the use of chemicals. Many substances so used have been simply deodorizers. Others have masked the unpleasant odor by a more powerful, but often disagreeable and pungent odor of their own. None have fully met the requirements of the case. Very recently, however, there has been a

most important addition to our armamentarium for such purposes, in the shape of a chemical known as salicylic acid. For the knowledge of the remarkable antiseptic properties of this agent we are principally indebted to Dr. Hermann Rolfe, of Leipsic, Germany, who was led thereto from the fact that he succeeded in making it from carbolic acid and carbonic acid, through the combined action of caustic soda and moderate heat. His investigations show that it scarcely has a rival as an antiseptic, and yet is inodorous, almost tasteless, and quite unirritating to the tissues, having none of the pungent or escharotic properties of carbolic acid.

One practical difficulty in its employment as a disinfectant of apartments, is its sparing solubility in water. European authorities advise the addition of phosphate of soda, as greatly increasing its solubility.

Mr. Shinn, however, a well-known pharmacist of Philadelphia, has discovered, as the result of experiments with a large number of solvents, that borate of soda, commonly known as borax, is very much more efficient.

This salt is the more desirable for this purpose, from the fact, but recently pointed out, that it is itself a powerful antiseptic. Salicylic acid, as an atmospheric purifier, should be dissolved with borate of soda, in the proportion of a drachm of each to three ounces of water, and distributed throughout the air of the apartment of the sick room by means of an atomizer. These articles may be obtained at any well regulated drug store in the country.

WATER AS RELATED TO DOMESTIC HYGIENE.

The place which water occupies in domestic hygiene is so important and extensive, that volumes would be required to give the subject that fullness of detail that would be desirable in a complete treatise on hygiene. We shall, therefore, in this report discuss only such points as are of primary importance and demand the attention of all.

All water comes from the atmosphere. There was a time when there did not exist any water in the liquid form on the surface of the earth. But as the earth has gradually cooled, the atmosphere has become less able to hold the watery vapor dissolved,

until now at the ordinary temperatures it contains but a very small per cent., and this is constantly varying with the changes in temperature and position.

Water vapor becoming condensed by change of temperature falls as rain in a very pure condition, and is returned to the air as vapor by various means, thus keeping up a constant and unbroken circle. Some of the water, as it falls, runs off into streams; some evaporates directly; some is absorbed by vegetables, and the rest soaks into the ground by its own weight and the force of capillary attraction, until it reaches an impermeable strata. Thence it follows the dip of this strata, and is discharged by springs to the rivers and ocean, where evaporation is rapid and constant.

For domestic uses water is obtained by sinking wells down toward the strata upon which the water lies, or through them, producing artesian wells, or from natural springs or rivers.

As rivers receive the water which washes the surface of the land, as well as spring water. river water contains a greater variety of impurities than any other. Spring or well water contains only those soluble substances which exist in the soil where they are located.

In selecting a site for building purposes, public or private, one of the first things to be considered is the water supply.

In the country where the land in the vicinity is kept clean, and no manures are used, and the soil contains no poisonous minerals, well water or spring water is always pure and healthy.

But in cities where the ground is covered by and saturated with poisonous organic and inorganic matter, *well* (or *pump*) water is not pure enough for domestic use, and we could not recommend it for such purposes.

We have not as yet been able to investigate the water supply of the different towns and cities of our State, but in regard to the water supply of Camden, we can say that it is taken from the Delaware river, and was purer last summer than that of Philadelphia taken from the Schuylkill, though our river is poisoned by the drainage of six large cities, which deposit tons of organic matter into it as it ebbs and flows.

Camden is situated upon an alluvial deposit and partly on "made" ground, very poorly adapted for wells. Some fifteen or twenty years ago there existed one or two good springs in the

city, but these have been destroyed. There are in Camden a number of pumps, which are not healthy, though much used. We noticed three cases of typhoid fever which appeared traceable to one of them.

On Mickle street, above Third, there is an artesian well. This well is about eighty feet deep, and passes through two or three strata of clay. Between these clay strata there were sandy, water-bearing deposits, but the water appeared to be surface water, and was offensive to the taste and smell. The water, which rises in this well to within a few feet of the surface of the ground, has the appearance of having come from the Delaware river by percolating through its bed, and was very good, but now seems to be contaminated by surface water, perhaps through some imperfection of the tube. Here I would especially call attention to a fact that seems almost, if not entirely, lost sight of by well-makers, namely, that when a well wall or tube passes through impermeable strata, as clay or rock, which has above it surface water of inferior quality, *water-tight* connection must be made between the wall or tube and this impermeable layer, or there will be contamination. The wall must also be completely water-tight from bottom to top.

Perhaps one of the best ways to provide water for domestic purposes is to collect the rain from the roofs of houses, or from surfaces made for that purpose. This has been demonstrated at Atlantic City, for last summer the best water I found at any place was there, wherè the inhabitants depend altogether upon the roofs for fresh water. The first washings from the roof should not be allowed to run into the cistern.

The average yearly rainfall throughout the State of New Jersey is about thirty inches, but varies in different parts, some towns receiving six inches more than others.

The average yearly fall in Camden is about forty-four inches. This amount has varied as much as twenty inches in different years.

In calculating for a water supply from rain, the yearly rainfall and the longest period of drought are important factors.

It is usually calculated that one person requires about twelve gallons of water per day for all purposes, though in some places a supply of three or four gallons is all that is had, but of course the people are not cleanly. In large towns and cities there is

generally allowed about ten gallons daily per individual for domestic purposes, ten for public and ten for manufacturing purposes, and forty gallons per head is even supplied in many cities.

A healthy adult requires daily about 85 ounces of water as drink and in food as a nutritive. The other demands, such as cooking and personal cleanliness, vary much according to the individual. Cleanliness is not only next to godliness, but is absolutely necessary to health, and, from Hippocrates down, every intelligent physician has recommended water bathing, both as a prophylactic and curative agent, when properly used. How few persons seem to appreciate the value of the *bath*.

In this respect the ancients shame us, for their arrangements for bathing were among the most important and extensive works in all towns and cities, and the remains of some of the ancient public baths exist to-day as monuments of art and culture.

Water, in a state of purity, is a compound of oxygen and hydrogen, containing 8 parts, by weight, of oxygen to 1 part of hydrogen. This oxide of hydrogen is what the chemist calls pure water; and for many of the purposes of chemistry it is necessary to obtain it as nearly as possible in this condition of absolute purity. This is usually effected by distillation, more or less frequently repeated, according to the degree of purity required. But when speaking of water as applied to drinking and culinary uses the term has a somewhat different signification. A water which appeared bright and clear, and possessed an agreeable taste, would be by most persons called pure; and if it contained none of those injurious substances that are undistinguishable to the taste, it might be considered pure, as far as all domestic uses are concerned. Chemically pure water is not an agreeable beverage. The sparkling appearance and slightly pungent taste of good drinking water is due to foreign substances which it contains in solution. All natural waters, whether obtained from springs, rivers, lakes or wells—even rain water itself—contains these foreign matters to a greater or less extent. It is the *nature* and *quantity* of the impurities that constitute the difference between good and bad water.

The purest natural water is rain water, when obtained as it falls directly from the clouds, without having come in contact with any terrestrial object in its passage downward to the earth. The first portions that fall are contaminated with dust and other

matters that are always floating in the atmosphere, and this is especially the case in and about populous localities.

After the rain has fallen for some time the air becomes in a great measure cleansed from these floating particles, and the water may then be collected, free from solid impurities. It, however, contains varying proportions of oxygen, nitrogen and carbonic acid gas, which it dissolves in its passage through the atmosphere; and, in addition to these, traces of ammonia and nitric acid are almost always to be found in rain water.

In natural waters obtained from terrestrial sources, more or less solid matter is always present. These dissolved solids vary in amount from less than one grain to several hundred grains in a gallon; in some saline springs even amounting to 20 or 25 per cent. of the total weight.

Much of the rain that falls upon the surface of the earth is absorbed by the porous soil, which contains much soluble matter. The water, in its downward percolation, dissolves portions of this soluble matter, the quantity usually increasing with the depth to which the water penetrates. For this reason the water of springs and wells generally contains much more dissolved matter than surface water. The water of rivers and lakes usually contains a much smaller proportion of dissolved solid matter than that of springs and wells.

But the impurities of water may consist not only of substances in solution, and therefore invisible, except by the color they sometimes impart, but also of matter mechanically suspended. Running streams are obviously subject to this kind of impurity, for the water of springs in its percolation through the earthy strata becomes completely freed from suspended matter, and issues clear and sparkling; while in a running stream, the action of the water on its banks and bed tends to disturb and carry away the materials of which they are composed, the motion of the water at the same time interfering with the subsidence of finely divided matter that may be washed into it. In streams possessing a rapid current the amount of mineral substances thus carried down is frequently enormous. "The water of the Mississippi contains forty grains of mud to the gallon; and it is estimated that this river carries four hundred million tons of sediment per annum into the Gulf of Mexico. The Ganges is said to carry down 6,368,000,000 cubic feet annually."

The impurities contained in natural waters are very numerous, as may well be supposed from the complex character of the crust of the earth, and the great variety of substances with which the water comes in contact. Springs whose waters contain mineral constituents in so great a proportion as to be plainly evident to the taste, as well as to produce a decided therapeutic effect upon the system, are known as mineral or medicinal springs. But the limits of this report prevent us from going beyond the consideration of those impurities that are liable to be present in water used for domestic purposes. The most common of these are sulphates of soda and lime, chlorides of potassium and sodium, bicarbonates of lime and magnesia, sometimes iron, and occasionally lead, which may be dissolved by the water in its passage through leaden pipes.

The hardness of many kinds of spring and well water is mainly due to the presence of sulphate or bicarbonate of lime, or both. These salts decompose the soap used in washing, forming an insoluble compound, and destroying its detergent properties. When bicarbonate of lime alone is present in the water its hardness is destroyed by boiling. A portion of the carbonic acid is driven off by the heat, and the lime converted into a neutral carbonate, which is insoluble in water and does not decompose soap.

The bicarbonate of lime may also be removed by the careful addition of lime water. This, by combining with the excess of carbonic acid, converts the whole of the lime into carbonate, which, being insoluble, is precipitated. For this reason, the presence of bicarbonate of lime in water constitutes what is termed temporary or removable hardness. Sulphate of lime is, however, not removable by boiling, and therefore this salt makes the water permanently hard. The presence of these salts to a moderate extent does not injure a water for domestic purposes. Most sanitary authorities are of the opinion that "water of moderate hardness is preferable to a very soft water" for domestic uses. The proportion said to be most desirable is given as about 6 grains of carbonate of lime to the gallon. The French authorities are so well satisfied of the superiority of hard water, that they pass by that of the sandy plains, near Paris, and go far away to the chalk hills of Champagne, where they find water even harder than that of London; giving as a reason for the preference that

more of the conscripts from the soft water districts are rejected on account of the want of strength of muscle, than from the hard water districts; from which they conclude that the calcareous matter is favorable to the formation of the tissues.

In addition to these solid matters, good water contains varying proportions of atmospheric air, and carbonic acid gas, to which it mainly owes its sparkling appearance and pleasant taste. But it is only in small quantities that these saline constituents are beneficial. The presence of lime or magnesia salts in large proportion is liable to produce dyspeptic and other affections.

"It is said that horses acquire a rough coat if supplied with water containing a large quantity of sulphate of lime. Goitre and cretinism are attributed to these impurities in water; at least the facts observed make this inference extremely probable. The goitre appeared in the Durham jail, afflicting a large proportion of the convicts. The spring water with which they were supplied was analyzed and found to contain 77 grains of lime and magnesia salts per gallon. On substituting for this a water containing only 18 grains of these salts, it was found that the old cases rapidly improved, while no new cases made their appearance. In the limestone districts of England, Switzerland, and Central New York, this goitre has been traced over considerable areas. At Goruckpoor, in India, where the waters are quite calcareous, 10 per cent. of the adults are afflicted with goitre, and many of the children are cretins. Even cats and dogs are said to be affected with cretinism. It is a curious fact that in Ireland, on the Waterford side of the Suir, where sandstones and slates prevail, goitre and cretinism are almost unknown, while on the Kilkenny side, where limestones abound, goitre is not uncommon.

"The products of the decomposition of animal matter in water is, however, the most objectionable impurity. Organic matters produced by the decomposition of vegetable substances are not especially dangerous, but the products of decomposing animal substances are highly dangerous, even when in minute quantities. These impurities do not make themselves apparent to the taste. On the contrary, such waters are frequently considered unusually fine in flavor, and persons go a great distance to procure them. Nevertheless, they contain an active poison. Many diseases of the most fatal character are now traced to the

use of water poisoned with the soakage from soils charged with sewage and excremental matters. Sudden outbreaks of disease of a dysenteric character are often caused by an irruption of sewage into wells, either from a break in a sewer or cesspool, or from some peculiarity of the season. Such contamination of the water is not indicated by any perceptible change in the appearance of the water. The filtered sewage, clear and transparent, carries with it the germs of the disease."*

Prof. Chandler thus enumerates the characteristics of a good drinking water:

"Its temperature should be at least 10 degrees lower than the temperature of the atmosphere, but it should not be much lower than 45 degrees, Fahrenheit. It should be free from taste, except, perhaps, a slight pungency from oxygen and carbonic acid, which is an advantage. Taste is, however, a poor guide. When one becomes accustomed to a certain water, pure water tastes flat by comparison; 50 grains of chloride of sodium in a gallon would hardly affect the taste perceptibly.

"A third requirement is freedom from smell. This should not be apparent, even when a bottle is half filled with water, placed in a warm place for a few hours, and then shaken.

"It should be transparent; not that it is necessarily injurious if not transparent, but it is preferable to take our solid food in other forms. Sometimes water may contain peaty matter from swamps, or vegetable matter from new reservoirs, which is not necessarily unwholesome.

"With regard to the total quantity of impurities admissible in good drinking water, the Sanitary Congress which met in Brussels decided that water containing more than 35 grains of impurity in one gallon is not wholesome, and there should not be much more than one grain of organic matter. 35 grains is a large quantity for city water, though well-waters frequently contain more."

The published analyses of the Delaware river water at Philadelphia give the total amount of solids at about 3 or 4 grains per gallon, while that of the Schuylkill somewhat exceeds this in amount.

The most important points to be determined in the examination of water intended for domestic uses are: the degree of hard-

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* *Extract from a lecture by Prof. C. F. Chandler.*

ness, the amount of sulphates of chlorides, and of organic matter.

The total amount of solids may be ascertained by evaporating a measured quantity to dryness, and weighing the residue.

The presence of lime salts is shown by the formation of a precipitate when solution of oxalate of ammonium is added: ("6 grains of lime per gallon gives a slight turbidity, 16 grains a distinct precipitate, 30 grains a large precipitate.")

If magnesia is present it is precipitated by adding ammonia and phosphate of soda to the water, after the lime is removed by the oxalate of ammonium.

A less delicate test for magnesia consists in the addition of ammonia alone to the water. "A good water should give only a slight haziness or none at all with ammonia."

Chlorides.—Acidulate the water slightly with nitric acid and add solution of nitrate of silver; a white curdy precipitate indicates soluble chlorides. The amount may be roughly estimated from the copiousness of the precipitate.

Sulphates—Acidulate with muriatic acid and add solution of chloride or nitrate of barium. A white, pulverulent precipitate shows the presence of sulphates in the water. "A good water should not give more than a slight haziness."

Organic Matter.—It would be impossible to describe in our present limits the methods employed by chemists for the determination of the kind and quantity of organic impurity in water. A simple and convenient method for its detection consists in adding to the suspected water sufficient solution of permanganate of potassa to impart a pinkish tinge. If oxidizable organic matter is present the permanganate will be decomposed and the color destroyed. The amount of permanganate decomposed by a stated quantity of water, and the rapidity of the action, is proportionate to the amount of organic matter present. This method, though by no means accurate, enables the amount of organic impurity to be estimated with sufficient accuracy for general purposes, especially if a comparative experiment be carried on at the same time with water of known purity. The presence of this kind of impurity may also be detected by evaporating a portion of the water to dryness, and subjecting the residue to a heat approaching redness. If the mass blackens, organic mat-

ter is present; and if an offensive odor is at the same time given off, it indicates that it contains material of animal origin.

Among the processes for the purification of water, filtration is the most commonly employed. But filtration through ordinary porous media, as sand, sponge, paper, &c., removes only those matters that are mechanically suspended in the water. For the removal of dissolved impurities other means must be resorted to.

When the impurities of water consist of an excess of soluble salts, it may be said that, in general, no practicable method of purification save that of distillation is known, except in the case of bicarbonate of lime, which, as before stated, is removable by simple boiling. But it is organic matter that constitutes the most insidious and dangerous impurity of drinking water. The well-known property which charcoal possesses of absorbing many organic matters, and the ease with which it may be obtained, render it peculiarly suitable as a purifying agent. "On this account water casks are generally charred on the inside to the depth of an eighth of an inch or so; and it is a common practice, when rain water cisterns become foul, to throw in a bushel or two of fresh charcoal." Many organic impurities are destroyed by boiling the water, and this is often adopted as a precautionary measure by travelers in malarious countries. Permanganate of potassa is one of the most efficient agents for the purification of water contaminated with organic matter. By the addition of a little of this salt to such water its impurities are oxidized, and destroyed as effectually as they would be by fire. Magnetic oxide and carbide of iron have been proposed as purifying agents, and by many authorities are highly recommended.

But for general use there is, perhaps, nothing better than the common charcoal filters. They have the advantage of being readily extemporized of materials always at hand. They are also now manufactured in various forms, and supplied to the market at prices so low as to be within the reach of all.

No water containing an appreciable quantity of organic impurity, especially where an animal origin may be suspected, should be used for cooking or drinking purposes without having been submitted to some one of these well-known methods of purification.

Report on Epidemics and Endemics

THAT HAVE OCCURRED IN THE STATE OF NEW JERSEY SINCE 1870.

BY THEODORE R. VARICK, M. D.

At the inaugural meeting of the State Board of Health, held in the city of Trenton, May, 1877, it was

"*Resolved*, That a committee be appointed to give a brief statement of endemics or epidemics that have occurred since 1870 in this State, and their causes, so far as ascertained."

The president appointed me as chairman, and Drs. J. E. Culver, of Hudson county, and Franklin Gauntt, of Burlington county, the other members of the committee.

The want of commissions for the collection of vital statistics was sorely felt, and the only source of information remaining, was a reference to the published reports of district societies, of which I gladly availed myself.

It is on occasions such as this that the system of annual reports, adopted by the State Society, exhibits its real value. By this system there is preserved a complete medical history of the State for each year, recording not only epidemics and endemics, but also individual cases of interest.

In making up this report I have culled from these communications facts bearing on the subject, for which this committee was appointed.

The medical year, according to the published transactions, runs from May to May, and I have adopted the same division in this report, as it would be impossible to separate each calendar year without creating inextricable confusion.

Extending over a period of seven years, the accounts of disease must of necessity be brief.

It will be perceived as we progress, that each county report is laid under contribution in alphabetical order, and if statistical information is deficient it is due to the facts already stated.

YEAR ENDING MAY, 1870.

Burlington County.—There is reported an exanthematous disease with catarrhal and anginose symptoms, in an epidemic form.

There seems to have been a doubt as to whether the disease was scarlatina or epidemic roseola.

Dr. Townsend, of Beverly, states "the eruption was precisely similar to measles, and has been universal since its first appearance. Most of the cases have ulceration of the tonsils similar to that in scarlatina, followed by glandular swellings, and in some cases dropsical effusions."

Dr. Budd, of Mt. Holly, "is confident that it is epidemic roseola."

It seems to me that the occurrence of adenitis and dropsical swelling settles the question in favor of its being scarlatina.

Dr. Cooper, of Camden, reports an epidemic of scarlet fever.

"The epidemic at first was mild, but in a short time assumed a much graver character, and when it once entered into a family of children it was almost certain to attack every member, and in many instances adult members suffered as well.

In most of the fatal cases, where death occurred early in the disease, cerebral symptoms, succeeded by profound coma, were first developed.

Such cases were almost always fatal, the system seeming to sink under the depressing effects of the poison before the disease had time to run its natural course.

In another class of fatal cases, the patient passed through the febrile stages with safety, the throat being only moderately sore, and the tongue not all dry, except during the height of the fever; but after the stage of desquamation had been completed, the patient seemed to sink into a typhoid state, with a small, frequent and feeble pulse with dark offensive sordes collecting about the mouth and on the teeth, with an entire disgust of food, the little sufferer finally sank from debility and exhaustion, in spite of iron, tonics and stimulants, in some cases as late as the third or fourth week from the commencement of the attack."

Dr. Marcy, of Cape May county, reports an epidemic of influenza, formerly known as Tyler's grip, and remarkable for nothing except pertinacity.

Diphtheria is reported as having become endemic, being found at all seasons, and sometimes of decidedly malignant type.

From Essex county we have the report that "the nearest approach to anything like an epidemic has been scarlatina, which has prevailed to a greater or less extent, often with great malignancy, throughout the year, and especially during the summer and winter, and up to the present time.

In Bloomfield, Essex county, an epidemic of diphtheria is reported by Drs. Tinsley and White; the type seems to have been mild and but few fatal cases occurring.

Dr. M. A. Miller, of the Jersey City Charity Hospital, reports the occurrence of a number of cases of typhus and typhoid fever, "lingering with us for months; resisting, too, the most earnest efforts directed towards ventilation and disinfection."

There was no evidence that either fever originated in the neighborhood. On the contrary, the source of contagion was traced directly to vessels in the harbor.

The cases of typhoid all recovered.

The first case of typhus was recognized in a sailor who was admitted to the hospital February 4th, from the steamer Tripoli. The disease ran a mild course and the patient recovered.

From this case a nurse who was in attendance contracted the fever February 26th, and died March 4th.

The second nurse employed in the fever ward was seized with the fever April 2d, and died April 4th.

The fever in both cases manifested a very malignant type, running its course in a short period of time.

In the latter case the eruption was very abundant over the extremities, as well as the trunk, and appeared on the second day of the disease.

A patient was admitted to the hospital April 6th, with symptoms of fever, was placed in the fever ward, and on April 10th a very copious eruption of typhus made its appearance, which continued prominent for fourteen days, and then began to recede, disappearing in the course of two or three days, the patient convalescing rapidly.

Dr. C. W. Larrison, of Hunterdon county, reports that erysipelas prevailed as an epidemic in January, 1870. "Those attacked suffered extremely from pain, stiffness of joints, irritability of the stomach and general debility."

Dr. Henry R. Baldwin, of Middlesex county, reports a number of sporadic cases of scarlatina occurring during the fall of 1869, which in the following winter assumed an epidemic form.

"It was a noticeable fact that it appeared in the Romish school and attacked those brought into immediate contact; when having exhausted all the susceptible, it traveled to the public school of the district of New Brunswick, and numbered many victims among the attendants. The sequelæ were unusually severe, many cases of albuminous nephritis following the attacks."

Dr. E. M. Hunt, of Metuchen, writes: "This disease (diphtheria) has prevailed at times in epidemic form at various points in the townships this side of the Raritan, almost from the period when first it was known in our country as a primary affection. In the small village of New Market, some six years since, it showed great fatality, between twenty and thirty persons dying thereof, and many of them adults, and at many other places it has occurred with persistence."

In Monmouth county an epidemic of mumps is reported, which attacked both children and adults.

YEAR ENDING MAY, 1871.

Burlington County.—Epidemic roseola still continues to be the master epidemic. Its symptoms are sometimes grave, and differ widely from those of the common rose rash. Severe inflammation of the fauces, attended with exudation of much catarrhal matter, were sometimes the most prominent symptoms. Also, inflammation of the submaxillary glands, extending to, and ending in great tumefaction and suppuration of the cellular tissue, were occasionally seen. Sometimes a furfuraceous desquamation was one of the sequelæ.

From Camden county we glean the following: "At the period of the close of the report of last year we noticed the fact that scarlatina of a severe type had been prevalent almost as an epidemic in the city of Camden and some of the neighboring villages.

"The united testimony of physicians from all parts of the county agree in the assertion, that both intermittent and remittent fevers have been on the decline for several years, and in

some neighborhoods, where they were constantly met with every summer and fall, they have almost entirely disappeared."

This, so far as the city of Camden and vicinity are concerned, is justly attributed to a system of underground drainage. This system "is still being each year extended, with a manifest and decided improvement in the health of the inhabitants of the districts in which such improvements have been made."

At a meeting of the Cumberland County District Medical Society, the question, "Are miasmatic diseases produced by salt marshes?" was introduced before the society for discussion, and it was unanimously decided "they are not," every member present having something to say on the subject. Nearly all have more or less practice in the neighborhood of salt marshes, and the opinion of some was that the influence of salt marshes was beneficial in miasmatic diseases, through its tonic qualities.

The experience and opinions of the profession of Cumberland county are somewhat at variance with the report from Essex county, to whom the same question was propounded by the chairman of the Standing Committee of the Medical Society of New Jersey.

The report states that the extensive meadows lying between Newark and Elizabeth City, known as the "salt meadows," do produce all forms of miasmatic diseases.

This seeming inconsistency may be reconciled by taking into consideration the fact that the meadows alluded to are not purely salt, but the water is, to a great extent, brackish, and seems to be particularly favorable to the evolution of malaria.

This remark will also apply to the Hackensack Meadows, in the region of Snake Hill and throughout Seacaucus, where intermittent fever is especially prevalent.

In Hunterdon county "an epidemic of typhoid fever occurred in this village (Ringoes) and vicinity, in the months of July, August and September, of a somewhat peculiar nature. The course of the disease was more rapid than that of any other typhoid epidemic that I have witnessed." The reporter, Dr. C. W. Larison, continues: "The emaciation was very rapid, but when the materies morbi had been entirely eliminated the patient recovered rapidly." The cause of the epidemic was traced to "a stagnant pool, into which was thrown, from time time, dead hens, dead pigs, &c., and into which the fluids of the barnyard were drained."

Dr. W. W. L. Phillips, of Mercer county, writes: "There is a locality in Trenton, situated near the junction of the canal and feeder, familiarly known as the Swamp, which is inhabited principally by negroes. The ground is some six feet below the level of the canal, is naturally swampy, and is illy drained. During the months of July and August last there prevailed among the denizens of this locality a fatal disease, which gave rise at the time to considerable alarm and discussion. Some twenty negroes were attacked and died. The cases were nearly all fatal, some dying as early as the second day. The disease was undoubtedly a malignant malarial fever. A few cases assumed the hemorrhagic type, bleeding profusely from the mucous membranes.

"The white people living in the vicinity were not attacked by the disease. After proper drainage and policing of the malarious district the disease abated."

YEAR ENDING MAY, 1872.

Dr. Frank Wilmarth, of Essex county, reports the fact "that epidemic influences have prevailed to a considerable extent, over a large portion of the district, for the year ending May 1, 1872.

"From May 1, 1871, to April 26, 1872, nine hundred and thirty cases of small-pox were reported in the city of Newark one hundred and twenty of which proved fatal. The largest number (two hundred and three) occurred in May, 1871; the smallest (fifteen) in September. Between these three months there was a gradual decline in the number of cases. Since September there has been a gradual increase, the number in March, 1872, reaching one hundred and eleven.

"On the 20th of May, 1871, the same disease made its appearance in the city of Orange. From that time until the present (May 1, 1872,) seventy-one cases have been noted, sixty four cases occurring before the 3d of August."

Dr. Lloyd records the fact that "sixty-one cases came under his observation; of this number, thirty-seven only had ever been vaccinated. Twenty-four cases were fatal; of these seven had been vaccinated, fifteen had not been; while evidence concerning the remaining two in this particular was doubtful."

Two of the fatal cases occurred in puerperal women.

In four instances the patients had been revaccinated from four

to six days previous to being attacked, the vaccine disease appearing with its characteristic pustule, following its usual course.

In Hudson county, small pox prevailed principally in Jersey City and Hoboken.

Prior to the establishment of a small pox hospital on the county farm, at Snake Hill, all cases occurring among the pauper population were sent to the Jersey City Charity Hospital.

From May, 1869, to the end of December, 1874, there were admitted of varioloid 66 cases, of which one died, a mortality of 1½ per cent.; of variola, 325 cases were committed, 122 died, 203 recovered, leaving a mortality of 37½ per cent.

A large proportion of the fatal cases were of the hemorrhagic variety, and several dying of œdema glottidis and others of pneumonia supervening during the attack. Its greatest prevalence was from December, '71, to December, '73.

Outside the hospital, its habitat was mostly in the more filthy parts of the city, and those portions occupied by tenements which, as is usually the case, were crowded to excess, and in a condition for the germination of disease in any form.

In Mercer county, in the month of July the city of Trenton "was invaded by an alarming epidemic of small pox. It first made its appearance in the central part of the city, in the most thickly populated portion and among the better class of citizens."

"It seemed for a time to be confined within a narrow circle of the business portion of the community; but, notwithstanding every precautionary measure was immediately taken by the Board of Health and the Common Council, to prevent the spread of the disease, it gradually spread until isolated cases were found in almost every part of the city.

"The disease was of a very severe type, and the number of deaths, in proportion to the number of cases quite large, being about one in six."

During the month of August small pox made its appearance in the city of Camden in a locality inhabited mostly by colored people.

The hygienic condition was particularly bad.

The houses and yards were small and filthy, with pig-pens and privy-wells often overflowing in close proximity to the houses, and a large portion of the population unprotected by vaccination.

Of a necessity the disease spread. By a thorough "policing" of the locality the disease was temporarily held in abeyance until October, when it spread to the surrounding districts.

At this time the disease existed in an epidemic form in Philadelphia.

To the constant intercourse of the inhabitants of the two cities is attributed the increase of the number of cases in Camden.

In the small-pox hospital the mortality reached 18.02 per cent., while in those cases treated in their own homes the fatal cases reached 16.04 per cent.

The mortality among the unvaccinated amounted to 37 per cent.

"Most of the deaths among those who had been vaccinated were from some intercurrent disease."

Dr. Goodell, of Sykesville, Burlington county, reports the following history of an endemic in his neighborhood: "The village of Pointville, which was visited by a peculiar form of fever during the summer and fall of 1872, contains about thirty families, composed of mechanics and laboring men, noted for their temperate habits and the cleanly and tidy appearance of their dwellings. Its elevation is about 160 feet above tide-water, and is the highest elevation, within an area of several miles, with good drainage.

"The soil is aluminous and fertile, bordering on white sand formation, which covers the surface of the pine region.

"There are no swamps or marshes sufficiently near to damage the salubrity of the village.

"This endemic numbered about fifty cases, sparing neither age nor sex. A general feeling of lassitude and headache was succeeded in a few days by a protracted chill, followed by a dry, hot skin, a feeble, irregular pulse, rarely under 120, attended with nausea and vomiting, with increased headache, pain in the eye-balls and intolerance of light.

"Delirium often accompanied this stage with extreme wakefulness, which, in some cases was succeeded by stupor approaching coma. The pupils would contract under a strong light, then dilate before the light was removed. The bowels were generally constipated, but readily responded to a mercurial cathartic. An unsatisfactory convalescence would sometimes commence about the ninth day, dating from the chill, but this was often followed by a relapse, protracting the case to five or six weeks. Some-

times pneumonia, either in an active or latent form, would complicate the case after the second or third week. The red tongue of typhoid fever was absent, and though they had irritable stomach and pain on making pressure over different parts of the abdomen, I never observed tympanites nor hemorrhage from the bowels. The skin was often examined for petecchial spots. Other practitioners who attended some of the cases thought they discovered indistinct traces of this specific eruption.

"Regarding the disease as a cerebro-spinal fever, with a strongly marked typhus tendency, much depletion, even in the commencement, was not ventured. I ought to remark that the cases which occurred were shared with four other practitioners, whose success was equal to my own, however much we might differ in theoretical views or therapeutic measures. I report but one fatal case, caused by a neglected pneumonia after convalescence seemed to be established."

Cumberland County.—Dr. R. M. Bateman reports: "An extended epidemic of scarlet fever raged throughout that section (Cedarville and Fairton, Cumberland county) during the latter part of the winter (1873–4), particularly fatal in the neighborhood of Fairton, also at Greenwich, in the same county. In the greater portion of the fatal cases, brain symptoms seemed to predominate. Adults as well as children suffered from the disease.

"Mumps prevailed epidemically in many parts of the county."

Dr. Love, of Montclair, Essex county, has met with a number of cases of typhoid fever, which, although not in an epidemic form, were so directly traceable to recognized causes that I give his report in full:

"All of them caused by either defective water closets in houses, or by want of cleanliness in reference to drains, privies or cellars."

"That in this day of enlightenment, as to the commonest rules of sanitary science, architects should plan and people should build expensive houses, in which and around which are water-closets, sewers and privy vaults, whose foul emanations pollute the air and the drinking water of the inhabitants, is to me a thing incomprehensible. To my personal knowledge, many an elegant villa and beautiful country residence is so constructed that the stench from the pipes leading to the abovementioned receptacles is such that the servants can scarcely endure to use stationary wash tubs, and the opening of the lid

of the slop-hopper in the second story fills the room with an abomination of putrescence. The servants have intermittent, madam has neuralgia, dyspepsia, and a host of ailments; the children have gastric fever and diphtheria, and they all wonder why country air don't agree with them. They go to the seaside in the summer, and to the city during the inclement winter months; the house is shut up, and a man servant is left to take care of it, who sleeps in the hall bed-room nights, and has typhoid fever. As it is impossible for running streams to purify themselves when polluted with sewage, so it is impossible for human beings to live with such surroundings and not contract disease."

YEAR ENDING MAY, 1874.

In Jersey City puerperal fever prevailed during the early part of the year to a considerable extent; in fact it assumed an epidemic character, continuing through a period of several months.

Quite a number of cases proved fatal, especially in primiparus, yet many recoveries serve to mark the mildness of the disease towards the latter part of the epidemic.

In reference to the subject, Dr. M. A. Miller, of Jersey City, writes: "Experience suggests that a distinction may be drawn between the cases as they have occurred. In severe attacks, terminating fatally, a post-mortem examination has invariably revealed extensive peritonitis, with puriform collections coexisting with hysteritis. In other cases the mildness of the symptoms would indicate that the inflammatory process has been limited to the proper tissues of the uterus, or involving also the uterine appendages; when such attacks have terminated in resolution and recovery, it may have been without exposing the organs to serious injury, or limiting the injury to adhesions between contiguous portions of the serous membrane. If, however, the fallopian tubes have been involved in the inflammation, the cavity of one or both may be obliterated, preventing altogether their ordinary functions. The following symptoms have been noted in connection with the cases under observation:

In the milder cases ending in recovery, the disease has been found to commence usually on the third or fourth day after confinement, and generally with rigors, followed by heat of skin,

thirst and headache, the heat of skin soon subsiding, the pulse rises in frequency to 100 or 110, the tongue dry and furred, and to these symptoms succeed nausea and vomiting and increased sensibility of the uterus.

As the disease advances the abdomen generally becomes tympanitic. The lochia are sometimes suppressed for a few days, and often fetid. The secretion of milk is usually arrested for the time. In one case convalescence was established within two weeks; in other cases deferred until the third and fourth week; but weakness and debility have been found to linger longer with the patients. In the more severe cases, the invasion of the disease on or before the third day after delivery has been marked by rigors, followed by heat of skin, thirst, flushed face, quickened pulse, and hurried respiration; the heat of skin, however, subsides under free perspiration, and during the further course of the disease may not exceed the normal standard.

These symptoms are soon followed by nausea, vomiting, pain in the head and tenderness in the iliac region. The patient early complains of pain in the abdomen, which generally commences in one of the iliac regions, and especially the right, radiating over the abdomen. Shortly after the disease is established, the abdomen becomes tumid and tympanitic; the tympanitis being due to air contained either in the intestines or peritoneal sac. The lochial discharge is usually suppressed early in the attack, returning after a few days changed in color and offensive in odor. The secretion of milk is suspended. The pulse is uniformly frequent throughout the disease, ranging from 110 to 140 generally small and wiry, but often feeble. The tongue may be found coated with a whitish fur in some cases, while in others it is dry and brown in the centre, with a white fur at the edges. The stomach is disturbed at a very early period, and the nausea and vomiting continue at intervals throughout the attack. Obstinate constipation marked most of the cases. The intellectual faculties have been but rarely affected; the patient retaining her consciousness and senses till very near the end.

A fatal termination has been usually found from the fifth to the tenth day from the invasion of the disease. In the several post-mortem examinations held at the Jersey City Charity Hospital, great uniformity has been observed in the morbid appear-

ances. On opening the abdomen, which, as a rule, was swollen and tympanitic, the intestines were found greatly distended with gas. The peritoneum generally exhibited signs of inflammatory action, being more or less vascular, especially that portion covering the uterus. The peritoneal sac contained a large quantity of a thick, yellowish, white-colored fluid. The omentum was reddened and congested, and covered by thick layers of pus, with layers of lymph agglutinating the omentum and intestines together. The uterus was surrounded by puriform matter, and not manifestly enlarged, but usually contracted to nearly the normal size. In opening the uterine cavity, false membranes of coagulable lymph, mixed with blood and lochia, were found on the lining membrane, which was thickened and congested. In all cases the lining membrane of the fallopian tubes was reddened and congested throughout."

Dr. J. L. Bodine reports from Mercer county that "Whooping cough, mumps, scarlet fever and measles have prevailed in an epidemic form during the year. In the month of November the State Normal and Model Schools were closed on account of the prevalence of scarlet fever. Whooping cough was the epidemic of the summer, mumps of the fall, and measles of the winter months, although these diseases have been distributed through the other seasons of the year.

"Trenton is largely engaged in the manufacture of pottery ware, and the nature of their employment produces certain forms of disease in the operatives in these works. Lead enters largely into the glaze upon the ware, and cases of lead poisoning are not infrequent.

"A peculiar form of pulmonary disease, known as potters' asthma and potters' consumption, is caused by inhaling the small particles of clay, quartz, plaster of paris and other articles which float in a pottery atmosphere. Chronic bronchitis, emphysema, dilated bronchia, consolidation and destruction of lung tissue result Post mortem examinations show cavities of various sizes in the lungs, and obliteration of the ultimate vesicular structure of the lungs."

In Monmouth county we have reported an epidemic of diphtheria of the most malignant and fatal character, prevailing during the winter months.

YEAR ENDING MAY, 1875.

Dr. Frank Wilmarth, of Essex county, reports: "In the central part of the county epidemics of parotitis and diphtheria have appeared, the former somewhat extended. Cases of the latter affection were not so numerous, but a majority were severe. In Orange and its vicinity it hovered about low, poorly drained localities almost entirely, leaving but little doubt that its origin holds a close relationship with unfavorable sanitary surroundings. The attending physician, in one instance where several members of a family had been attacked, found the drinking water from the well markedly impure, as evidence in smell and taste, and in the deposit of a sediment in which the microscope discovered a fungous development analagous to, if not precisely like, that which has been observed in the exudation characteristic of the malady. The well was in close proximity to a cesspool, whose impurities had found easy access to the water. Long before the dipththeritic troubles were encountered, the family had noticed the unnatural features of the water; but persisted in its use, ignoring the notion that nauseous odors and tastes are bestowed for a benevolent purpose."

From Dr. Chas. F. Deshler, of Mercer county, we learn that "epidemic diphtheria prevailed in the eastern portion of the county from November to April. According to the testimony of the neighboring physicians, in the vicinity of Hightstown alone there occurred more than one hundred cases."

YEAR ENDING MAY, 1876.

Dr. A. S. Burdett, of Hackensack, Bergen county, writes: "Diphtheria has been rife; its fatality in some localities fearful."

Dr. D. A. Currie, of Englewood, writes: "During the month of December, 1874, and January, February March and April, 1875, diphtheria raged to an alarming extent in this valley. The disease was uncomplicated diphtheria, and proved fatal sometimes by the accession of croup consequent upon the extension of the disease into the larynx and trachea; at others by exhaustion.

The first case occurred in a family of five, living in a large tenement, all of whom had the disease. The case died.

"The family being Irish, the usual 'wake' was held, although three other cases were found to exist at the same time. In three days afterward twenty-eight cases were found in families who had sent delegates to the 'wake.' From this time until about the middle of April there were new cases occurring almost daily."

Dr. C. reports 135 cases as having occurred in his practice, within a period of five months.

In Essex county, in the city of Newark and suburbs, diphtheria raged during the colder months, and also in Montclair, proving fatal in a large number of cases.

"In the neighborhood of Paulsboro, Gloucester county, diphtheria has prevailed as an epidemic, for a time very fatally."

In Hudson county, diphtheria prevailed extensively during the whole year. No locality was exempt from its attack, although it was particularly fatal in damp, illy ventilated and filthy localities.

It is reported that it comprised 17.4 per cent. of the entire mortuary record for the year. In reference to the fatality of the disease, the percentage was 32 for the fall, 29 per cent. in winter, 21 per cent. in summer, and 18 per cent. in the spring.

In Hunterdon county, Dr. M. Abel writes that in the region of Quakertown "diphtheria has prevailed almost the whole year. The type of the ailment has been mild, and from it there have resulted but few deaths."

Dr. D. C. English, of Middlesex county, reports that "diphtheria has never, we believe, been so prevalent and of so malignant a type as in the city of New Brunswick and in South Amboy; and we think it owing largely to the neglect of the adoption of proper hygienic or sanitary measures for the prevention and mitigation of disease.

"During the past five or six months there have been according to the statements of our undertakers, over 250 deaths from this disease in New Brunswick; and we reckon, from the meagre statistics we have been able to collect, that the mortality has been about 20 per cent."

In South Amboy, according to the accounts given by Dr. Treganowan, the ratio of mortality was about the same.

"The instances were exceedingly rare where children under eighteen months have taken the disease, the vast majority having

been from three to ten or twelve years, between which ages was also by far the greatest mortality. Adults almost invariably recovered, some of whom were severely attacked."

In Monmouth county "diphtheria of a malignant type has prevailed at Long Branch and vicinity with great mortality, leaving few families who do not mourn the early departure of some little one, and in some cases it has counted all among its victims."

In Morris county diphtheria prevailed as an epidemic at Rockaway, Boonton and Middle Valley. In the vicinity of Rockaway there were about one hundred and fifty cases, with a mortality of twelve per cent. At Middle Valley there were perhaps forty cases. At Boonton there occurred thirty-five cases, with a death rate of twenty per cent.

In Sussex county, Dr. Moore, of Deckertown, records an epidemic of diphtheria during the preceding winter and spring.

In Union county, in the city of Rahway, there is reported an epidemic of diphtheria of a mild type, with a small rate of mortality.

There is also reported an epidemic of the same disease at Oxford and in the borough of Washington, in Warren county.

YEAR ENDING MAY, 1877.

In Mercer county diphtheria prevailed throughout the whole county. In Hightstown, Dr. Deshler reports, that "it assumed epidemic proportions during the fall and winter ('76–7) with an average fatality of about twenty per cent. Sporadic cases of this disease had been in the neighborhood during several preceding years, the last one occurring some six months before the appearance of the epidemic."

Dr. D. further reports, "reliable testimony places the number of cases of diphtheria at one hundred and forty; probably had all the cases been reported the number would not be below one hundred and sixty, distributed through fifty-seven families.

"There were thirty deaths, divided among twenty families.

"*Origin.*—The first cases appeared in July, shortly after a warm rain, in several families living in the same locality.

"The land is low, with an impervious subsoil, is water soaked except when drained by artificial means, has a small brook run-

ning through the centre of it with low banks, on which this portion of the town is situated; the houses are mostly without underground cellars, or if there are such they are always wet, except where protected by cemented walls.

"Without entering into details, we may justly say, that at this examination the condition of the streets, yards, and outhouses, with few exceptions, were decidedly unsanitary. The brook was so obstructed in many places by accumulations of refuse and fæcal matter as to change it from a running stream into mere pools of filthy water, exhaling offensive vapors. An important drain also was found partly obstructed by putrefying animal and vegetable substances.

"Effluvia from these sources vitiated the surrounding atmosphere and rendered it decidedly unwholesome.

"*Nature of the Soil.*—In an attempt to determine the influence exerted in the production and propagation of this disease by the character of the soil, the following was noticed:

Of the 57 house infected

16 had good natural drainage.

41 had not good natural drainage.

Artificial drainage rarely received adequate attention. Further examination revealed:

15 houses with dry cellars in which were 40 cases.

12 houses with wet cellars in which were 29 cases.

30 houses with no cellars in which were 71 cases.

Deaths are distributed as follows:

9 in houses with dry cellars.

8 in houses with wet cellars.

13 in houses with no cellars.

"*Social Relations.*—These include the conditions of domestic life as regards space, food, air, clothing, vocation, habits, etc., and are estimated as follows:

12 families with 29 patients, good.

9 families with 25 patients, ordinary.

34 families with 84 patients, bad.

Deaths as follows:

8 with social conditions good.

22 with social conditions not good.

"*Seasons and Weather.*—Deaths occurred as follows:

2 in July.

3 in August.
2 in September.
7 in October.
7 in November.
1 in December.
2 in February.
1 in March.
2 in April.
1 in May.
2 not known.

"The 79 cases recorded, are distributed as follows:

22 in August.
4 in September.
33 in October.
4 in November.
7 in December.
4 in January.
4 in February.
1 in April.

"*Contagion.*—In 29 families, which may be taken as a type of all affected, 23 received it by contagion; 5 not known, though contagion probable; 1 contagion not probable, as the house was located in the suburbs, to which the children had been scrupulously confined.

A majority of the cases traced their origin to the public schools, and as these are efficient agents of communication in this, as well as all similar diseases, it is a question whether the closing of them under these circumstances should not be imperatively demanded.

"*Forms.*—Seventy-nine recorded cases show variations of form as follows: Twenty-eight of catarrhal variety, in which the constitutional symptoms were mild, the exudation limited in extent and confined to the tonsils; fifty-one of the croupous form, in which the constitutional disturbance was marked, the exudation copious, and extending to the other portions of the throat. In forty-three of these it was confined to the pharynx; in five, extended into the nasal passages, and in three into the larynx.

" Terminations—Nine in death:

3 from croup.
5 from direct effects of the poison.

1 from the sequelæ, hemiplegia.
22 in paralysis:
6 muscles of the neck.
8 muscles of the extremities.
5 muscles of the soft palate.
2 muscles of the eyes.
1 hemiplegia.

The Doctor concludes with the following resume:

"*Houses*—
26 per cent. with dry cellars.
21 per cent. with wet cellars.
53 per cent. with no cellars.

" *Nature of Soil*—
28 per cent. good natural drainage.
72 per cent. not good natural drainage.

" *Social Relations*—
22 per cent. good.
16 per cent. ordinary.
62 per cent. bad.

" *Deaths*—
30 per cent. in houses with dry cellars.
27 per cent. in houses with wet cellars.
43 per cent. in houses with no cellars.
27 per cent. social relations good.
73 per cent. social relations not good.

" *Contagion*—
79 per cent. traced to contagion.
21 per cent. not traced to contagion.

" *Results*—
20 per cent. terminated in death.
28 per cent. terminated in paralysis."

In the practice of Dr. Newell in the western section of Mon-

mouth county, diphtheria is reported as being unusually malignant, and assuming in many cases a croupous form.

The reporter from Morris, referring to a previous report, writes that diphtheria began to prevail at Middle Valley in the fall of 1875, and during its subsidence, at the present time, 1877, was attended with a mortality of about 8 per cent.

There is also recorded the interesting fact that the town of Chester, only five miles distant, was not attacked until September, 1876, notwithstanding the constant intercourse between the two towns.

The disease reached its climax about the first of January following.

Although many of the cases were of a severe type, the death rate was small. "In the winter of '75–'76 it was quite prevalent in Morristown, and yet it did not reach Whippany, a village only four miles distant, until August last, when it appeared in a most malignant form. At first the death rate was 100 per cent., but the disease became much less severe in type, and began to subside in December.

Dr. Miller, the resident physician, reports twelve cases under treatment since the first of January, all ending in recovery.

About 10 per cent. was complicated with paralysis of one part or another. The paralysis continued for periods, varying from a fortnight to three months, and in a few instances complete muscular use was not obtained until a much later time.

MALARIAL FEVERS IN HUDSON COUNTY, BEING A PART OF THE REPORT ON ENDEMICS AND EPIDEMICS. BY J. E. CULVER, M. D.

Malarial fevers are to be found at all times in all parts of Hudson county. Remittents occur oftenest in the low lands; intermittents abound everywhere. Their prevalence is, however, observed to vary with the changing seasons; for example, the cold weather of winter diminishes the attacks to the minimum number, spring and summer increase them, and the maximum is reached in the early autumn months. During my service in St. Francis Hospital this year, throughout which the number of patients in hospital remained nearly the same, there were treated ten cases of malarial fever in January, eleven cases in May, and forty-one cases in September. In October just past,

there were thirty cases in the same hospital. The different types of malarial fevers are somewhat interchangable, and in no wise do they habitually conform to the strict classical descriptions of them. An intermittent under bad management may become remittent; and a remittent under proper treatment may become intermittent. So likewise may quartans and tertians become quotidians, and vice versa. There occur, indeed, occasionally, both ephemeral and mild continuous fevers of malarial origin. In process of rapid recovery, all types soon become indistinguishable.

In the mortuary statistics, published by the Hudson County Board of Health, thirty-three deaths in 1875, and twenty-three deaths in 1876, are ascribed to remittent fever. Possibly these are but so many errors of diagnosis; for the Health Board has to accept all "pathists" and midwives as competent to sign burial certificates. In a practice of almost thirty years, I have never met with a death from malarial fever, except three or four fatal cases of pernicious intermittents. These "congestive chills," as they are styled, occur very rarely, and, as far as my experience goes, they destroy only youths of great vascularity, full of blood and lymph, mostly females about the period of commencing menstruation. The fever begins as a mild quotidian, the fatal chill taking place on the second, third, or fourth day, initiated by a marked venosity of the blood, and ending tragically in sudden and profound collapse.

Perhaps the most conspicuous of all the characteristics of malarial fevers, is their tendency to recurrences, or relapses. If a patient under successful treatment for intermittent fever, discontinued his remedies immediately when the fever is "broken," it will, in most cases, return in one, two or three weeks. Every resident of Hudson county is perpetually made conscious of malarial influences in his own person; and he is fortunate indeed who does not suffer every year from repeated attacks of fever. An old gentleman, a native, intelligent and observant, once told me, that for sixty years he had averaged a renewal of his periodic fever not less than twice yearly. The theory of acclimatization is here totally fallacious; none are exempt. The converse maxim, namely, that the more one has suffered from malarial influences the less power he has to resist them, is nearer the truth. Accordingly, change of climate is a most efficient remedy.

It is memorable in the medical world, that, not very long ago, an effort was put forth to contradistinguish "Relapsing Fever" from all other fevers; but the symptoms and peculiarities on which its differentiation was sought to be established, are not more material than are contrasts which present clinically between different cases of the same fever; and its most distinctive feature, the ralapse, furnishes strong presumptive proof of its identity with fevers of malarial origin. The relapse indicates that the pathogenic agent acts continuously.

The victims of malarial influences are subject to all the vicissitudes of our ever-changing climate, and they embrace a multitude of persons who have already acquired pathological conditions, from causes both climatic and non-climatic. These complicating circumstances appear quite sufficient to account for the almost limitless range of symptoms, their varied prominence individually and relatively; and their dissimilar groupings in different patients. But however multiplex and inconstant are the symptoms of malarial fever, the following conditions are unfailingly present, varying only in degree.

1. A sense of weariness and inaptitutde for exertion, both mental and physical hyperesthesia.

2. The fever fluctuates diurnally.

3. There is venosity of the blood and excess of the blood-corpuscles, with relative deficiency of fibrin.

4. During the febrile exacerbation there coexist a rapid pulse, obstructed circulation, local congestions, turgid veins—especially of the portal system.

5. Uric acid and its salts are found in the urine in abnormally increased proportion, the urea being relatively diminished.

6. The urine is scanty. The respiratory mucous membranes are abnormally dry during the chill and febrile stage; and accordingly as moisture returns to them, and respiratory evaporation becomes re-established, the temperature of the body declines throughout the scale from highest fever heat to normal. During the chill and early fever the skin is dry also, but at length a superabundant perspiration breaks forth, which evaporates from the entire surface of the body, and assists to restore the normal temperature; and, *ceteris paribus*, according to the continuance of the perspiration, will the apyrexial stage be partial or complete.

The number of cases of malarial fevers decreases during cold weather; it does not increase *pari passu* with the accessions of summer heat. Dryness of the atmosphere favors recoveries and lessens the number of seizures, both during warm weather and cold alike. Therefore neither cold, nor heat, nor dryness, but dampness of the atmosphere, appears to be the climatic condition essentially conducive to the development of our endemic fevers.

Putrefaction, fermentation and the eremacausis of ligneous matters do not, separately or conjointly, cause malarial diseases. I recognize the fact that a growing vegetation, from every leaf, sends forth its daily modicum of aqueous vapor into the surrounding atmosphere, and thus contributes its share in maintaining a damp climate. But the plant-growth of Hudson county is mostly all husbanded, or washed away, or destroyed by fire; and there are not many places in this latitude, throughout the habitable world, where, acre for acre, so little humus is added to the soil annually. Moreover, the products of ligneous decay are water, carbonic acid, carburetted hydrogen and the residuary humus; all innocuous, and pre-eminently so as regards the etiology of malarial diseases. Fermentation yields to the atmosphere only carbonic acid gas, and a slight loss of vapor of the commercial product obtained. Concerning putrefaction it need only be remarked in this place, that it is a matter of fact of daily observation, that malarial fevers occur altogether independently of either putrefaction, fermentation or eremacausis, and that they exhibit none of the pathological phenomena to which either of these chemical processes may give rise.

Suppurative fever imitates malarial, inasmuch as it presents a distinct chill, a fever, and a sweating stage, but here the resemblance ends; its prevalence is not governed by the changing seasons; its symptoms have not their diurnal recurrences; the blood and urine have a different composition; its therapeutic indications, means and results, are not the same; and the formation of pus is its etiological *sine qua non.*

Our climate is eminently moist. The broad gulf stream, warm, and teeming with vapor, stretches eastward more than a thousand miles, and nearly that distance southward. The west and southwest winds come to us over the expanse of a continent checkered with water surface and a humid soil. Bergen Hill, the principal

habitable part of Hudson county, a ridge of very unsymmetric shape and variable width, averaging perhaps three-fourths of a mile wide and fourteen miles in length, trends a little west of south, sloping from the "Palisades" where it is 250 or 300 feet high, down to the ocean level at Bergen Point. It is trap, rock broken and precipitous along its eastern face, generally covered on its top with hard-pan overlaid with a thin soil; its western declivity gradual, and composed of water-worn pebbles, gravel, and sand, here and there piled in irregular mounds, and terraces, and undulations, the whole landscape sloping down to the Hackensack marshes. These prairie-like marshes cover an area of more than one hundred square miles. Besides, the eastern border of our county also is skirted with marshes and lowlands. Over these paludal regions, east and west, fogs brood at night, and sometimes they rise above the highest summit of the hill. The annual rainfall is about fifty inches deep; but even this is no criterion of the atmospheric moisture. Observations made with the hygrometer and thermometer repeated morning, noon and night through several years, show that our atmosphere is surcharged with moisture during all the warmer months, a few brief intervals excepted; that saturation at sundown is the general rule; and that in the hottest middays of midsummer, the wet bulb commonly stands only 5° to 7° Fahrenheit below the dry.

Now let us inquire what are the known and necessary consequences to the performance of the vital functions of man, of his breathing constantly an atmosphere nearly saturated with aqueous vapor.

1. The inspired vapor is warmed and expanded in the lungs, and it excludes just so much air as would fill the space it occupies. It dilutes the air and thereby renders the respired oxygen a less energetic supporter of combustion. Wherefore, less oxygen is admitted to the lungs; its affinity for the oxidizable constituents of the blood is weakened, and the vital fires burn low.

2. The inspiratory effort not only draws air from without into the alveoli of the lungs, but thither also, simultaneously, by the same vacuum force, carbonic acid from the blood traversing the alveolar network of capillaries. To this force, at the temperature of venous blood, the bicarbonate of soda it contains gives up one proportion of carbonic acid. But the watery vapor inhaled,

warmed and removed from atmospheric pressure in the lungs, expands perchance even more rapidly than the air it sophisticates, whereby it more or less counterbalances the vacuum force, and to this extent, defeats the physiological disengagement of the carbonic acid from its alkaline base.

3. Whatever the hygrometric condition of the *inspired* air, the *expired* air as it issues from the air passages of man in health, is always saturated with aqueous vapor. By this method from one to three drops of water are expelled from the body with every expiration, amounting to a total of from three and one-half to ten pints in twenty-four hours. But in an atmosphere saturated with vapor at a temperature of 96° Fahrenheit, respiratory evaporation ceases absolutely, and life cannot long be maintained; and exactly in proportion as the air contains moisture, this principal outlet of water from the body is shut off. It is because the capacity of the air for moisture is diminished by that which it already contains, that pulmonary and cutaneous evaporation fail in a damp atmosphere. At first the secretion of urine augments a little; and then it, too, falls below the normal amount. Water accumulates in the blood, and the vascular system is soon replete to a degree of tension, that perverts and obstructs every physiological function. Relief comes at length—often a partial relief only—but not until the vital force is well-nigh exhausted, do the emunctories of the skin give way and the pent-up torrents find vent.

4. Evaporation is a cooling process. As a vital function it takes place chiefly in the respiratory apparatus. In a state of perfect health the cutaneous transpiration is insignificant in quantity—the older physiologists to the contrary notwithstanding. Forsooth the most important function of the skin depends on its dryness and impermeability to moisture. I once had a patient sick with scarlet fever from whose body desquamation removed the entire cuticle; and the consequence was an exudation of a serous liquid containing albumen, amounting to from two to four pints per day, and jeopardizing life. Renewal of the cuticle betimes put a stop to the morbid drainage. Respiratory evaporation physiologically outmeasures the cutaneous at all times. Nevertheless, cutaneous evaporation is considerable in a dry atmosphere when the surface of the body is wet with perspiration. But whenever and to whatever extent beyond the physi-

ological limit, the dampness of the air arrests evaporation, the heat of the body accumulates abnormally. In fact pulmonary oxygenation falls off at the same time, but it does not stay the pyrexia. Fever, of every type, is attended with dryness of the skin and respiratory mucous membranes and with obstructed and feeble circulation; and herein, in the consequent arrest of evaporation, lies the true explanation of the origin of fever heat.

5. Either hyperpyrexia, or congelation, can destroy life. In both these antipodal temperatures of the body alike, man dies by total anesthesia of sense and motion. A deficient respiratory evaporation—deficient, that is to say, below the range of physiological variations—causes not only pyrexial rise of the temperature of the body, but hyperemia and hyperesthesia at the same time as well. Hyperesthesia is a morbidly exalted sense of fatigue, pain—intolerance of light, sound, smell, taste, contact,—weakness and inability to put forth and control muscular effort. It accompanies hyperpyrexia and ends in death by exhaustion of nerve power and complete paralysis. External cold causes anesthesia in a direct manner; not, however, unattended temporarily by local pains in parts rendered relatively hyperesthetic. The conclusion seems incontrovertible that normal innervation, no less than normal temperature, is maintained and governed by the physiological balance of the calorific and the cooling processes. When an atmosphere burdened with moisture disturbs the equipoise of the vital functions, then hyperesthesia arises as surely as do hyperemia and pyrexia. In point of fact hyperemia alone, regardless of coexisting fever, implies hyperesthesia; examples of which can profitably be studied in our climatic neuralgias.

6. A damp atmosphere, in proportion to the vapor it contains. increases the uric acid and diminishes the urea in human urine. In certain extreme pathological phases, human urine also exhibits a trace of uric oxide. These excreta are the nitroganized residua of the disintegration of connective tissue. The capillary blood vessels are neither more nor less than unlined tunnels through the connective tissue, whose walls are continually reamed and worn away by the chemical action upon them of the oxygen brought hither by the blood-corpuscles. Urea is the almost exclusive excretion of animals having biconcave red corpuscles, as the mammalia (the urine of carnivorous

mammals yields only faint traces of uric acid); uric acid, of animals having biconvex red corpuscles, as the oviparous vertebrata; and uric oxide has been found to be the normal urinary constituent of some of the lower invertebrate animals, the araneidans for example. The biconcave corpuscles contain more iron and carry more oxygen; the biconvex contain less iron and carry less oxygen; and the blood-analogue of the araneidans contains too little iron to form blood-corpuscles, and carries of oxygen least of all.

The formula for urea is $C^2H^4N^2O^2$.

The formula for uric acid is $C^5H^1N^2O^2$.

The formula for uric oxide is $C^5H^2N^2O^2$.

To complete the combustion of urea requires the addition to it of six equivalents of oxygen only, while uric acid takes nine, and uric oxide ten. Urea in human urine is the product of a perfect physiological oxidation of the nitrogenized connective tissue disintegrated; uric acid is the product of imperfect oxidation, and uric oxide of an oxidation more imperfect still. When, therefore, the moisture of the air respired is observed to increase the uric acid in human urine, and, pre-eminently, if it add thereto a trace of uric oxide also, a retardation of tissue-metamorphosis is indicated thereby, which is unmistakably pathological.

7. The most variable constituent of the air is moisture. The quantity of moisture which a given volume of air will hold, increases with the temperature, but in a much faster ratio than the temperature. It follows from this law, that, in a damp climate like our own, the diurnal changes of temperature dependent on the presence of the sun's rays by day and their absence by night, are vastly exceeded by the diurnal fluctuations in the amount of moisture diffused through the air. All the vital functions of man must needs feel and respond to these regular atmospheric alternations, potent as they are, and of life-long continuance. And, verily, man has his diurnal mutations of temperature, of energy, of vascular fulness, of gland-secretion, &c., which he tolerates well within the accustomed physiological range; but which are liable by stress of weather to extend beyond the limits of tolerance and health into the domain of pathology. Malarial fevers are but picture-expressions of the abnormal exaggeration of these diurnal ebbs and floods that run through all vital phe-

nomena, whensoever, and inasmuch as, they exhibit diurnal exacerbations and remissions, intermissions and recurrences.

If, therefore, all the pathological conditions of malarial fevers are demonstrably identical, each with each, with the functional disturbances which of necessity result to man from dwelling in, and breathing an atmosphere highly charged with aqueous vapor; if the records of cases and the readings of the hygrometer, combine to show that when and where continued excess of atmospheric moisture coexists with great diurnal variations, then and there malarial diseases prevail most numerously; or, if we regard the fact that the alternating atmospheric influences of day and night, and of the changing seasons, stamp their impress on malarial diseases in unmistakable minuteness of detail; the conclusion seems to be unavoidable that the true *malaria*, the etiological factor in the origin of our climatic fevers, is *atmospheric moisture.*

The philosopher who revels in visions of final causes, and has an intangible myth for every unexplained phenomenon, attributes to "poisons," "spores" or "disease-germs," all pathological appearances, the source of which he fails to comprehend. It has, of late years, grown to be fashionable in scientific circles, the world over, to peer through a microscope deep into the innermost intentions and capabilities of these pristine parents of disease. How often have M. Pasteur and his disciples, by this means, caught sight of some abhorrent infinitessimal in the very act of manufacturing a pestilence! This most excellent method of discovery commends itself to plausible students of a metaphysical turn of mind, too indolent for genuine scientific investigation. Should any such professional *savant* take exception to the views here enunciated, he has only to exhibit a "self-propagating disease-germ" gravid with embryo intermittents, and to point out to me that other class of diseases, not malarial, to which the morbific influences of a moist atmosphere are accustomed to give rise, and I shall most cheerfully relegate the malarial fevers of our country back to the misdeeds of "algoid cryptogams" and "the scientific uses of the imagination."

9

Notes on Localities Injurious to Health by Reason of Imperfect Drainage.

BY GEORGE H. COOK, STATE GEOLOGIST OF N. J.

The prevalence of intermittents and other diseases which are limited to particular districts, is an indication of an unwholesome state of the earth, or of the atmosphere over it. As a general rule, such diseases are peculiar to localities which are badly drained. There are many such spots in our State, and every year the sickness and suffering from insufficient drainage are such as to excite the sympathy of every lover of his race. And the losses from suspensions and derangements of business make up a large amount of value, taken from the wealth of the country, by this very unnecessary cause of disease. Pond holes, half drained swamps, flat grounds subject to overflow in freshets, and illy-drained pastures and meadows, are the localities which are particularly exposed to the visitation of these periodic diseases. Such localities are more common in the northern than in the southern part of the State.

A few facts in regard to the unwholesome effects of such grounds will best illustrate this subject.

"The Drowned Lands" occupy the valley of the Wallkill from Hampton, three miles west of Goshen, in Orange county, to near Hamburgh, in Sussex county, a distance of 37 miles by the course of the stream, and of 20 miles in a straight line. They cover 25,600 acres, of which 15,600 are in Orange county, and 10,000 in Sussex. As early as 1742, Dr. Cadwallader Colden, Surveyor General of the Province of New York, wrote of the insalubrity of these lands. "The inhabitants along the Wallkill are yearly afflicted with intermittent fevers during the summer season, and a constant fog or vapor is observed almost all the summer (except in the time when the northerly or northwest winds blow), to arise over the river, and to remain there at a certain height

and distance every morning." In the Medical Repository for 1809, Dr. D. R. Arnell stated in a Report to the State Medical Society of New York, "that an act was passed before the Revolutionary war to enable the proprietors of those lands to drain them. An attempt was then made, and about two thousand pounds expended at the outlet of the Wallkill; but the Revolution coming on, put a stop to labors." He also said that, "along the Wallkill and Otterkill or Murderer's creek, the tertian intermittent and remittent fevers prevail to a great degree in the fall of the year; but on the west side of the drowned lands they put on a more dangerous and formidable appearance than they do in other parts of the county." In the American Medical and Philosophical Register for 1810, is "an account of the fever which lately prevailed at the drowned lands in Orange county, by Dr. D. R. Arnell."

Omitting much of detail, he says "the lands are generally overflowed with water the greater part of the season;" also "the water was confined back on the drowned lands during the day, but at night the gates were opened and it was suffered to pass off." "The proprietors have been incorporated into a company for draining them, and have employed a large number of workmen for that purpose the last three summers. The country around them is hilly, rough and uneven, and has been visited with remittent and intermittent fevers during the autumn for a number of years past; but the fever has never put on so malignant and dangerous an appearance as it has the two last seasons, at the outlet of the drowned lands, among the workmen and hands employed in draining them."

In an article on the Drowned Lands of Orange county, N. Y., and Sussex county, N. J., published by the American Public Health Association, in their second volume of Reports, is a note from Hon. Wm. Owen, who resides near Pine Island, in those lands. He says, "chills and fever are common in autumn, everywhere along the borders of the drowned lands and on the islands. Before the outlet was cut there were seasons in which the majority of the residents were sick with intermittents. Since that time such diseases have been less common, though they still prevail to an unpleasant degree. The hill country, which borders this part of the valley, is entirely exempt from chills and fever. It is thought, too, by some careful observers, that pulmo-

nary disease is more common along the eastern border of this tract than it is along its western side, owing to the prevailing westerly wind, which carries the damp, chilly air from these wet and really drowned lands."

In the same article there is also a note from Samuel E. Gale, Esq., of Pine Island, upon the same subject. He says, "About forty-five years ago we derived considerable benefit from an improved drainage, the effect of cutting a canal lower than the old bed of the Wallkill at Hampton, and a small portion of these lands was redeemed and made tillable, demonstrating the fact that a system of perfect drainage is all that is required to make this the strongest soil, and also the most productive of any in either of the States in which it is located. Previous to the cutting of this channel these lands were entirely under water for from three to four months each year, and were productive of nothing but wild grass and weeds, of no value and unfit for use. Not only would perfect drainage be a benefit to the soil, but I think it would have a good effect upon the health of the residents upon and around the lands. For the past forty-five years chills and fever have prevailed in the summer, making it almost impossible for strangers to escape the dreaded disease. I notice the percentage is far greater here on the islands than on the hilly districts of Orange and Sussex. Although the freshets are not so great or of as long continuance as before the cutting of the canal, yet every spring and fall these lands are overflowed, and our crossroads almost impassable by reason of being for a week or ten days from six to thirty-six inches under water. Last season, while the dry weather ruined all the hay crops on uplands, our redeemed drowned lands were covered with a heavy burden of good grass. A freshet came before the people had time to secure the grass, rendering it impossible to get on the lands, and thus nine-tenths of the crop was destroyed. These are facts in regard to the drowned lands which any resident near them will corroborate."

In the same article is still another from Dr. Wm. B. Bradner, who is practising near the drowned lands, and describes the effects of the stagnant waters of one of the branches of the Wallkill, which joins it there. He says "our creek flows through and should drain 3,000 acres of heavy boggy land, but probably half of the year, 2,000 acres are overflowed and covered with stagnant

water, and then slowly drying into pools and water soaked soil, and in very dry seasons becoming passably free from water. Now last spring the rains were sufficient to cover these lands, and it was summer before they were dried out; but the summer was very dry at first, until nearly all the marsh land was drained and dried up, then came the heavy rains, and everything was again afloat there, then another dry time followed. The result is this, miasmatic diseases have reached a pitch unknown here, and who can doubt the cause? When I say 40 years, I refer to a historic period, for about that time the physicians residing here compelled the citizens to destroy a mill-dam below the village, and thereby secured a passable drainage of the meadow lands south of us. They did so in hopes of removing the cause of a most terrible fever then prevailing here, and when the mill-dam was gone and the meadow drained, there was an end of the fever. The same creek is now checked with debris and sand bars, so that we are suffering the same way our fathers did nearly a half century ago. I have attended very many cases this year, nearly all of them occurring in the valley. True, some were sick on the mountains, but it is a noteworthy fact that the only case I have seen sick with any form of miasmatic disease on the mountains this year, was a man who had worked daily in the valley, and doubtless contracted the disease there, and not on the hill tops."

The annual report on the progress of the Geological Survey for this year, has an account of the drainage of the Great Meadows on the Pequest in Warren county, in which there is testimony to the former insalubrity of that region. Drs. Blackwell and Cooke of Hackettstown, Dr. Roe of Vienna, and Dr. Hartpence of Oxford, all of whom have practiced along the borders of the meadows, say that autumnal fevers and malarial disorders prevailed there much more than in the hilly country around, and they attribute these to the stagnant water and undrained ground of the meadows. Dr. Blackwell says "it appeared to me while sojourning in this neighborhood and marking the effect of these blighting influencs upon the health of the people, that I could preceive in the lessened vigor and robustness of many of the residents, the results of this insidious and baleful poison. According to my observation, this is by far the worst malarious district in this part of the State. The outbreak of malaria always occurs when the overflow of the Pequest drying up, leaves its sedimentary matter,

as well as the earth soaked with deadly gases, to the full influence of the fierce autumn sun."

The Passaic river has numerous large bodies of undrained land along its borders, in Morris, Union and Essex counties. Between 20,000 and 25,000 acres of land are there, liable to freshets and overflow, and to bring upon the people living on or near them an annual attack of chills and fever. Such diseases are very prevalent in seasons when the freshets occur, after the grass is grown, so as to hold back the water that overflows the meadows, and let it become stagnant. A single extract from a letter of Dr. E. R. Laine, of Caldwell, Essex county, is sufficient to illustrate this, though it is not a thousandth part of the ill effects that have been experienced from this lack of proper drainage. Writing in the winter of 1875 he says: "On the 10th of August, 1875, there occurred a heavy rain storm, which completely submerged the lowlands bordering the Passaic above Little Falls. This storm was followed by a warm, dry spell of weather, which caused the tall vegetation to rapidly ferment and decay to such an extent as to give the water of the river the appearance of strong tea, so saturated was it with vegetable juices. Upon the subsidence of the water from the inundated meadows and exposure to the hot sun, they emitted an extremely unpleasant odor that was perceptible a mile off in some directions.

"The above condition of things led me to think it a most favorable one for the development of malarial troubles, and to anticipate an early epidemic of intermittents. I was not mistaken in my surmises, for in three weeks from the time of the storm it made its appearance. I soon had my hands full, though there were a great many cases that did not come under my notice—the patients treating themselves with quinine and other well-known remedies. A curious circumstance connected with the cases under my treatment was the fact that some four or five patients had the paroxysm commence on the same day and same hour of the day, and continue in the same manner for some time.

"Most of the cases occurred in the neighborhood of what are known as the Great and Little Pieces on Horse Neck, where there were fifteen. There were six cases at Pine Brook, and on the higher grounds there were only four which came under my treatment."

One of the gentlemen having charge of the draft that was made

in Morris county for soldiers in the late war, informs us that the number of persons exempted on account of lack of physical health and vigor, was by far greater in the townships in which these undrained lands lie, than in any other. And it was understood by those concerned in the examination, that failure of health and vitality was owing to the insalubrious atmosphere to which they were so unfortunate as to be exposed.

There are many other tracts of ground of smaller extent within the State, from which other testimony of the same kind could be obtained. But the above is sufficient. The evil is one of great public importance in the present condition of our State. Located near the great centres of business on this continent, and having a delightful climate, it attracts new residents to all its pleasant and salubrious districts, and is destined soon to be the most densely populated of any of the United States. The removal of these few causes of disease will help to make it most uniformly healthy.

Heretofore, drainage in the country has been done only for its agricultural benefits, and the lands drained have been assessed to pay the expenses. The damage to individual health, and the loss of life to families have been borne without aid or relief from the public authorities. Mill-dams, and obstructions hindering the free flow of streams, have been considered of too much value to be removed on any ground of public good or sanitary benefit. The time has come when public authorities must interpose to protect suffering communities, and by a judicious and equitable use of their credit, authorize and encourage well-planned works of drainage.

Meteorological Tables.

NEWARK, N. J. 1873—1877.

No. 1.—Showing the Minimum, Maximum and Mean Temperature, and the quantity of Water from Rain and Melted Snow for each Month.

MONTHS.	Years.	MIN'M TEMP'E. Date.	MIN'M TEMP'E. Degree.	MAX'M TEMP'E. Date.	MAX'M TEMP'E. Degree.	Mean of Month.	Inches of Rain and Melted Snow.	Mean Temperature, 5 years.	Mean Water Fall, 5 years.
	1873	30	—12	16	42¼	24.77	5.820		
	4	16	9	23	61¼	32.61	5.670		
January	5	19	—3	22	37	22.92	3.310	28.20	3.812
	6	14	12¼	2	65	34.90	1.200		
	7	6	7½	27	42½	25.80	3.060		
	1873	24	—1½	8	47¾	27.41	3.885		
	4	2	3¼	23	68½	28.66	3.168		
February	5	10	1¼	24	48¾	22.92	2.400	29.12	3.292
	6	5	6½	13	55¼	32.13	5.355		
	7	14	11	21	49	34.46	1.650		
	1873	5	8½	23	52	34.47	2.760		
	4	13	15½	4	63¼	37.83	2.135		
March	5	1	10¾	30	56	31.84	3.820	35.57	4.958
	6	19	10¾	7	66¼	36.13	10.000		
	7	19	13	23	59½	37.56	6.075		
	1873	1	33¼	28	64½	46.58	5.835		
	4	5	20¾	15	66¼	41.48	8.715		
April	5	19	22	2	68	43.42	3.135	45.87	4.823
	6	9	29	14	69½	48.46	3.305		
	7	3	30¾	24	78½	49.40	3.125		
	1873	4	36¾	28	83	57.97	3.755		
	4	3	33¾	10	88¼	58.62	2.755		
May	5	3	36¼	21	85¼	60 13	1.595	59.35	2.432
	6	1	35¾	7	85¼	59.46	3.045		
	7	3	37¼	18	87	60.56	1.010		
	1873	3	47¾	19	88¾	68.59	1.715		
	4	2	50½	29	91	69.41	3.580		
June	5	14	47	25	92	68.75	2.335	70.10	2.677
	6	1	47¾	26	90	72.18	1.585		
	7	23	53¾	26	93½	71.58	4.170		

No. 1 (Continued).—Showing the Minimum, Maximum and Mean Temperature, and the quantity of Water from Rain and Melted Snow for each Month.

MONTHS.	Years.	MIN'M TEMP'E. Date.	MIN'M TEMP'E. Degree.	MAX'M TEMP'E. Date.	MAX'M TEMP'E. Degree.	Mean of Month.	Inches of Rain and Melted Snow.	Mean Temperature, 5 years.	Mean Water Fall, 5 years.
	1873	12	58	3	91½	74.13	6.615		
	4	5	59½	15	88½	73.48	4.230		
July	5	24	58	6	91	72.88	5.985	75.33	5.172
	6	27	58	9	98	78.31	3.060		
	7	14	60½	26	99	77.86	5.980		
	1873	24	56½	3	88½	74.40	7.765		
	4	27	53½	20	89	69.21	2.785		
August	5	3	56½	31	83¾	70.94	10.215	73.05	6.189
	6	22	53½	7	92¼	74.15	2.450		
	7	6	60	8	94¾	76.57	7.730		
	1873	15	42¾	1	84½	63.89	3.550		
	4	22	48	11	88¼	66.79	9.050		
September	5	23	41	3	85½	62.50	1.930	64.55	4.701
	6	28	45¾	1	88	62.81	7.505		
	7	23	47½	14	85	66.74	1.470		
	1873	30	30	5	71¾	53.37	3.740		
	4	15	33½	29	70¼	53.69	2.435		
October	5	14	33½	25	69½	51.83	2.870	52.63	3.608
	6	30	30¾	6	71¼	48.67	1.260		
	7	23	35¾	16	75½	55.57	7.735		
	1873	21	20½	3	57¼	36.12	4.670		
	4	14	20¾	6	64½	40.98	2.860		
November	5	30	8	13	61¾	37.98	4.360	40.72	4.569
	6	29	27½	2	70	43.92	4.040		
	7	21	25¾	9	65¼	44.82	6.915		
	1873	31	16¾	4	64¾	34.38	2.476		
	4	15	7¾	3	50½	31.19	2.810		
December	5	20	2½	23	58½	32.30	2.610	31.87	2.266
	6	10	4	13	44	23.81	2.515		
	7	2	22¾	20	58½	37.65	0.920		

No. 2.—Showing the Minimum, Maximum and Mean Temperature, and the quantity of Water from Rain and Melted Snow in each year, with the number of days on which it was fair or on which rain or snow fell.

YEARS.	MINIMUM.		MAXIMUM.		Mean Temp.	Inches of Rain and Melted Snow.	Fair on Days.	Rain on Days.	Snow on Days.
	Date.	Degree.	Date.	Degree.					
1873	Jan. 12	−12	July 3	91½	49.34	52.580	232	97	35
1874	Feb. 2	3¼	June 29	91	50.41	50.193	239	92	28
1875	Jan. 19	−3	June 25	92	48.20	44.565	219	102	44
1876	Dec. 10	4	July 9	98	51.23	45.320	216	96	31
1877	Jan. 6	7½	July 26	99	53.21	49.840	228	98	13
Average of the five years..................					50.48	48.500	227	97	30

No. 3.—Showing the Minimum, Maximum and Mean Temperature and the quantity of Water deposited in each Season.

SEASONS.	Years.	MINIMUM.		MAXIMUM.		Mean Temp.	Inches of Rain and Melt'd Snow.	Mean Temp., 5 years.	Mean Water Fall, 5 years.
		Date.	Degree.	Date.	Degree.				
	1873	Mar. 5	8½	May 28	83	46.27	12.350		
	4	" 13	15½	" 10	88¼	45.97	13.605		
Spring	5	" 1	10¾	" 21	85¼	45.13	8.550	46.91	12.213
	6	" 19	10¾	" 7	85¼	48.05	16.350		
	7	" 19	13	" 18	87	49.14	10.210		
	1873	June 3	47¾	July 3	91½	71.04	16.095		
	4	" 2	50½	June 29	91	70.70	10.595		
Summer	5	" 14	47	" 25	92	70.86	18.545	72.56	12.042
	6	" 1	47¾	July 9	98	74.88	7.095		
	7	" 23	53¾	" 26	99	75.34	17.880		
	1873	Nov. 21	20½	Sept. 5	84½	51.12	11.960		
	4	" 14	20¼	" 11	88¼	53.82	14.345		
Autumn.........	5	" 30	8	" 3	85½	50.77	9.160	52.63	12.878
	6	" 29	27½	" 1	88	51.73	12.805		
	7	" 30	27	" 14	85	55.71	16.120		
	1872–3	Jan. 30	—12	Feb. 8	47¾	25.59	13.490		
	3–4	Feb. 2	3¼	" 23	68½	32.21	11.308		
Winter	4–5	Jan. 19	—3	Dec. 3	50½	25.67	8.520	28.92	9.942
	5–6	Dec. 20	2½	Jan. 2	65	33.11	9 165		
	6–7	" 10	4	Feb. 21	49	28.03	7.225		

NO. 4.—SHOWING THE AMOUNT OF SNOW FOR THE LAST FIVE YEARS—STATION, NEWARK.

INCHES OF SNOW EACH WINTER.

MONTHS.	1872-3	1873-4	1874-5	1875-6	1876-7
October	....	....	....	1	....
November	3½	....	....	0½	....
December	25	8	21	1¼	13¼
January	14	6	17	¾	21¾
February	23½	22	5	10	1¼
March	2	5	17½	6½	7½
April	3	5	7½	....	....
Total each winter	71	46	68	20	43¾

NO. 5.—APPROXIMATE WINDS—NEWARK 1877.

From observations of the general course of the wind each morning and afternoon. The figures being the result of the addition of half days:

MONTHS.	N.	N. to N. E.	N. E.	N. E. to E.	E.	E. to S. E.	S. E.	S. E. to S.	S.	S. to S. W.	S. W.	S. W. to W.	W.	W. to N. W.	N. W.	N. W. to N.	NO. DAYS.
January	1	2	3	...	...	...	2	...	1	...	8	2	4	2	5	1	31
February	1	3	2	...	...	...	1	...	...	...	3	4	1	3	7	3	28
March	1	3	7	1	...	1	2	...	...	...	4	1	2	1	7	1	31
April	...	2	8	3	3	2	3	...	...	...	2	...	...	1	4	2	30
May	2	1	2	1	1	...	4	...	...	2	5	1	2	1	8	1	31
June	...	...	2	1	2	1	7	2	1	...	8	3	1	...	2	...	30
July	...	2	5	...	...	2	6	1	...	...	4	2	2	1	5	1	31
August	...	2	3	1	1	1	3	1	1	...	4	1	6	...	6	1	31
September	...	1	3	...	1	...	5	2	...	1	9	...	2	1	5	...	30
October	1	...	5	...	1	...	4	...	...	...	5	1	6	...	7	1	31
November	1	1	5	1	1	...	2	...	1	...	5	1	4	1	6	1	30
December	1	...	8	1	...	...	...	...	1	...	5	3	5	3	3	1	31

METEOROLOGICAL SUMMARY FOR 1877 OF OBSERVATIONS BY E. R. COOK.—STATION, TRENTON.

Thermometer highest—August 29 .... 93°
Thermometer lowest—January 3 .... 7°

Rained on 69 days; *Snowed 3 times; 17 thunder showers; 15 fogs; †27 frosts; 5 hail storms.

First frost, September 22; first ice, November 7; first snow, November 21.

Amount of rain fallen in each month:

	INCHES.
January	2.10
February	1.31
March	5.65
April	2.70
May	0.91
June	4.45
July	7.40
August	5.47
September	3.45
October	6.50
November	8.41
December	2.90
	51.25

* Snows since November 21.
† Frosts since September 22.

METEOROLOGICAL RECORDS FURNISHED BY EZRA A. OSBORNE, C. E.

BAROMETER.

Monthly and Annual mean pressure—July, 1875, to June, 1876, inclusive.

STATIONS.	1875. July.	August.	September.	October.	November.	December.	1876. January.	February.	March.	April.	May.	June.	Annual Means.
Atlantic City	29.996	30.036	30.040	30.001	30.087	30.020	30.149	30.115	30.028	29.995	30.061	30.010	30.045
Barnegat	29.987	30.030	30.026	29.993	30.067	30.003	30.136	30.108	30.019	29.986	30.055	30.004	30.034
Cape May	29.999	30.028	30.043	30.009	30.092	30.032	30.165	30.127	30.039	30.009	30.064	30.018	30.052
Long Branch	29.987	30.043	30.032	29.994	30.076	30.024	30.132	30.112	30.018	29.982	30.048	29.998	30.037
Sandy Hook	29.971	30.024	30.011	29.977	30.070	30.006	30.112	30.092	29.999	29.963	30.026	29.981	30.019

THERMOMETER.

Monthly and Annual mean temperature—July, 1875, to June, 1876, inclusive.

STATIONS.	1875. July.	August.	September.	October.	November.	December.	1876. January.	February.	March.	April.	May.	June.	Annual Means.
	°	°	°	°	°	°	°	°	°	°	°	°	°
Atlantic City	73.0	72.0	64.1	54.5	40.7	35.8	37.2	34.6	36.5	46.1	55.5	68.2	51.5
Barnegat	72.5	71.6	64.5	53.9	40.4	36.4	36.7	33.9	36.3	46.0	56.0	67.3	52.1
Cape May	72.8	71.6	64.7	55.4	43.2	38.5	39.7	37.5	38.3	47.7	57.3	70.5	53.1
Long Branch	72.8	71 2	64.1	54.1	41.3	36.6	38.3	34.9	37.7	45.5	56.5	68.4	51.8
Sandy Hook	73.0	71.7	64.0	53.4	40.9	34.3	36.4	33.3	36.7	46.8	58.7	71.7	52.6

RAIN FALL.

Monthly and Annual amounts of rain fall, in inches, from July, 1875, to June, 1876, inclusive.

STATIONS.	1875.						1876.						Annual Amounts.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Atlantic City	1.30	4.78	2.45	2.17	4.19	4.28	1.05	3.53	4.78	1.86	3.92	1.78	36.09
Barnegat	5.97	4.18	3.99	1.67	5.40	4.63	1.55	4.04	9.18	3.06	3.79	2.42	49.88
Cape May	3.13	10.16	2.70	2.03	4.75	3.39	1.14	2.78	7.31	3.10	3.25	5.67	49.41
Long Branch	7.19	11.93	4.05	3.40	7.27	4.32	1.62	5.69	10.57	3.51	4.73	4.54	68.82
Sandy Hook	4.44	8 96	2.98	3.50	5.36	3.40	1.35	5.80	11.04	3.92	4.47	5.96	61.18

SIGNAL STATIONS IN NEW JERSEY.

ATLANTIC CITY.

Latitude	39° 22′
Longitude	74° 25′
Mean barometer for the year ending June 30, 1876	30.045
Mean temperature for the year ending June 30, 1876	51°.5
Amount of rain fall for the year ending June 30, 1876	36.09 inches.

BARNEGAT.

Latitude	39° 48′
Longitude	74° 9′
Mean barometer for the year ending June 30, 1876	30.034
Mean temperature for the year ending June 30, 1876	52°.1
Amount of rain fall for the year ending June 30, 1876	49.88 inches.

CAPE MAY.

Latitude	38° 56′
Longitude	74° 58′
Mean barometer for the year ending June 30, 1876	30.052
Mean temperature for the year ending June 30, 1876	53°.1
Amount of rain fall for the year ending June 30, 1876	49.41 inches.

LONG BRANCH.

Latitude	40° 18′
Longitude	73° 59′
Mean barometer for the year ending June 30, 1876	30.037
Mean temperature for the year ending June 30, 1876	51°.8
Amount of rain fall for the year ending June 30, 1876	68.82 inches.

SANDY HOOK.

Latitude	40° 28′
Longitude	74° 1′
Mean barometer for the year ending June 30, 1876	30.019
Mean temperature for the year ending June 30, 1876	52°.6
Amount of rain fall for the year ending June 30, 1876	61.18 inches.

REFERENCE TO FORMER STATE LAWS BEARING ON PUBLIC HEALTH.

1798? VITAL STATISTICS.

1. An act relating to the registry and returns of births, marriages and deaths in the State of New Jersey. Pamphlet Laws of 1848, page 155.

2. A supplement to an act entitled "An act relating to the registry and returns of births, marriages and deaths in the State of New Jersey," approved March third, eighteen hundred and forty-eight. Pamphlet Laws of 1851, page 434.

3. A supplement to an act entitled "An act relating to the registry and returns of births, marriages and deaths in the State of New Jersey," approved March third, eighteen hundred and forty-eight. Pamphlet Laws of 1862, page 161.

4. A further supplement to an act entitled "An act relating to the registry and returns of births, marriages and deaths in the State of New Jersey," approved March third, eighteen hundred and forty-eight. Pamphlet Laws of 1863, page 405.

5. A further supplement to the act entitled "An act relating to the registry and returns of births, deaths and marriages in the State of New Jersey," approved March thirtieth, one thousand eight hundred and forty-six. Pamphlet Laws of 1863, page 472.
(A mistake has been made in the title of this supplement in referring to the act of "one thousand eight hundred and forty-six," for I find no such act.)

6. An act to provide for a board of health and vital statistics in the county of Hudson, and to prevent the spread of diseases. Pamphlet Laws of 1874, page 569.

7. A supplement to the act entitled "An act concerning marriages, births and deaths," approved March twenty-seventh, eighteen hundred and seventy-four. Pamphlet Laws of 1876, page 158.
(The title is wrongly quoted.)

8. A supplement to an act entitled "An act concerning marriages, births and deaths," approved March twenty-seventh, eighteen hundred and seventy-four. Pamphlet Laws of 1877, page 168.

9. An act to amend an act entitled "A supplement to an act entitled 'An act concerning marriages, births and deaths,'" approved March twenty.seventh, eighteen hundred and seventy-four, which supplement was approved April seventeenth, eighteen hundred and seventy-six. Pamphlet Laws of 1877, page 214.

10. Special law for the city of Newark entitled, "An act for the registration of births, marriages and deaths in the city of Newark." Pamphlet Laws of 1871, page 805.

MEDICINE AND SURGERY.

11. An act to reorganize the Medical Society of New Jersey (former act and all supplements repealed.) Pamphlet Laws of 1864, page 250, and Revised Statutes of 1877, page 675.

QUARANTINE.

An act to relieve owners and officers of vessels owned in New Jersey from detention at quarantine. Pamphlet Laws of 1874, page 57, and Revised Statutes of 1877, page 300, relates to quarantine.

PUBLIC HEALTH.

An act concerning unwholesome food, making the selling of unwholesome food criminal. Nixon's Digest, page 206, section 77.

An act relating to public health. Pamphlet Laws of 1874, page 47.

An act to establish a State Board of Health. Pamphlet Laws of 1877, page 220.

An act relating to the appointment of a sanitary commission. Pamphlet Laws of 1866, page 982.

An act relating to the sanitary condition of the public schools. Pamphlet Laws of 1873, page 152.

INFECTIOUS DISEASES.

1. An act to prevent the introduction of malignant and other infectous diseases in this State, (former act repealed.) Pamphlet Laws of 1871, page 84, and Revised Statutes of 1877, page 300.

An act to prevent diseases among cattle. Pamphlet Laws of 1866, page 981, &c.

NOTE.—The permission of the New Jersey Agricultural Society to be obtained, for the shipment of cattle from foreign countries, by public advertisement in three newspapers.

ADULTERATIONS.

1. An act making it a criminal offence to manufacture, or sell, or import already manufactured for sale, any adulterated or spurious liquors in the State of New Jersey. Pamphlet Laws of 1871, page 105.

2. An act to prevent the adulteration of milk, and to prevent traffic in impure and unwholesome milk. Pamphlet Laws of 1875, page 58.

NUISANCE.

Nuisance at common law deemed a misdemeanor. Revised Statutes of 1877, page 261, sec. 192.

VACCINATION.

Commission to report what they may deem important respecting "the vaccination of the indigent." Pamphlet Laws 1866, p. 982.

PHARMACY.

An act to regulate pharmacy. Pamphlet Laws of 1877, page 211.

An Act to establish a State Board of Health.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey,* That the governor shall appoint seven persons, who, together with the Secretary of state and attorney general as ex-officio members, shall constitute the board of health of the State of New Jersey; the persons so appointed shall hold their officers for seven years; *provided,* that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire each year, and the vacancies so created, as well as all vacancies occurring otherwise shall be filled by the governor.

2. *And be it enacted,* That the board shall take cognizance of the interests of health and life among the citizens of this State; they shall make sanitary investigations and inquiries in respect to the people, the causes of disease, and especially of epidemics and the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health; and they shall gather such information in respect to these matters as they may deem proper for diffusion among the people; they shall also make inquiries and reports in reference to diseases affecting animals, and the methods of prevention; they shall appoint a chairman, who shall call meetings as often as every three months, or when requested to do so by three members of the board; they shall, in the month of December, make report to the governor of their investigations and opinions during the year ending December first, with such suggestions as they may deem necessary; *provided,* that the provisions of this act shall not apply to any city, borough or township in which there is a local board of health.

3. *And be it enacted,* The board shall elect a secretary from their own number who shall superintend the work prescribed in the law, as the board may require; the entire expense in prosecuting inquiries and securing the desired information shall not exceed one thousand dollars; and said amount shall be payable by the comptroller on account rendered, and signed by the president and secretary of the board and approved by the governor.

4. *And be it enacted,* That this act shall take effect immediately.

Approved March 9, 1877.

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REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY

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II.

TRENTON, N. J.:
NAAR, DAY & NAAR, PRINTERS.
1878.

REPORT

OF THE

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OF THE

STATE OF NEW JERSEY

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II.

TRENTON, N. J.:
NAAR, DAY & NAAR, PRINTERS
1878.

STATE BOARD OF HEALTH.

	P. O. Address.
ELIAS J. MARSH	Paterson.
LABAN DENNIS	Newark.
CYRUS F. BRACKETT	Princeton.
JAMES M. RIDGE	Camden.
THEODORE R. VARICK	Jersey City.
EZRA M. HUNT	Metuchen.
E. A. OSBORNE	Middletown.

HON. HENRY C. KELSEY, Secretary of State, Ex-Officio.
HON. JOHN P. STOCKTON, Attorney General, Ex-Officio.

President	ELIAS J. MARSH.
Corresponding Secretary	EZRA M. HUNT.
Recording Clerk	E. A. OSBORNE.

Report of the Secretary of the Board.

To His Excellency, George B. McClellan, Governor:

The State Board of Health of New Jersey begs leave to make report to your excellency in reference to those matters which concern the interests of health and life among the citizens of this State.

The past year has been one which has of itself prominently set forth the great dependency of civic and material welfare and prosperity upon the health of the citizen. It has shown the terror and embarrassment of epidemics, has drawn most earnest attention to the sources of mortality and in many ways illustrated the effects of localities, employments, conditions and circumstances on the public health.

By a wide spread scourge our whole land has been awakened into sympathy, while within our State there have been localized outbreaks of disease and prevalent sources of ill-health, which have attracted the attention of our citizens. Two persons died within our State of yellow fever. One arrived from Memphis at his father's house in Closter, Bergen county, in apparent good health. Another death from yellow fever is also reported to us from Long Branch.

It is well to remember that New York county and city had from yellow fever over 2,000 deaths in a single year, over 3,000 between 1798 and 1806, that New Jersey had outbreaks at about the same time in five different places, that Philadelphia between 1793 and 1805 numbered from it over 10,000 deaths and that at times since, and notably in 1822 and 1853, it has had a considerable mortality as near us. As it has been the habit of the epidemic to appear successive years in other cities after once gaining headway at central points, we may not be without guard lest our own State should directly suffer from it in exposed localities.

But the occurrence of such an infection is not merely of interest as it concerns one disease or the section especially exposed to its ravages.

The infections of remittent or periodic fevers, of scarlet fever, diphtheria, and many other allied diseases have a history so similar and analogies so suggestive, that the study of any one of the species is a part of the study of other groups.

As to each and all, the most radical question is that of origin. Where and how is the poison generated? Is it only an exotic or is it a native? Or having once been exotic has it become naturalized?

Is it produced within or without the individual? Can it multiply itself so that the person comes to be a source of infection? Is the infectious particle made active by changes after it has left the body? What effect thereupon or upon the person falling sick is produced by surroundings?

Many such questions propound themselves for answer and it is well for all to know that with patient, laborious, hopeful work origin is being studied and some most important facts are awaiting classification and interpretation.

A next important and more successful study is that of the mode of propagation. If we do not know the origin, yet if we can determine the modes and circumstances of propagation of these various infectious diseases, we are thus able to get at facts which help us to limit them.

If we may not catch the infective particle which is the essential cause of chills and fever or the whole train of periodic fevers, yet if we can find that proper drainage limits it, that there are conditions of enforced vegetable decay that intensify it, that avoidance of too early or late exposure, or sleeping in high and dry apartments, or the use of a little bitter extract each day will protect us, we have gained important knowledge for ourselves and for the State.

It is for such reasons that the history of diseases, and of their modes of invasion and spread, becomes of such vital importance to society. We are learning that our most hopeful dealing with many diseases is likely to be in the direction of prevention, rather than in the discovery of specifics for cure. This will bring much of the welfare of the citizens under the care of the State. State medicine has already a wide

and weighty sphere in that it attempts to diminish the necessity for so great reliance on hospitals, asylums and other invalid resorts. It would conserve the interest of the citizen and the material welfare of the State by expending something for prevention and abate the necessity for so lavish expenditures in retention or cure.

We are to remember that not only epidemics disturb the natural course of population and load burdens grievous to be borne upon communities. There are silent forces at work, causing deterioration of health which although without sudden outbreaks are nevertheless potent for reduction and destruction. Like the small steady fire of an infantry corps they kill as many in the aggregate as does the heavy ordnance which occasionally wheels into action. Consumption with its thousands of victims and disorders of the digestive canal which carry to the grave such numbers of children are in a very large majority of cases manufactured diseases. They directly depend upon foul and overheated air, the moisture resulting from impeded evaporation, bad drainage and improper feeding, and improper construction of buildings. In the study of these there is a sphere for preventive medicine, not a whit smaller than that which demands attention through sudden or periodic invasions. The social condition of the people, which means the welfare of the State, is largely interested in the prevention of all preventable sickness.

PROMINENT DISEASES.

The two diseases to which in our State our attention has needed to be attracted for the past year are malarial fevers and diphtheria.

In the prevalence of periodic fevers we have shared in common with portions of adjacent States. Their tax upon material interests is not to be measured either by the number of deaths, nor on the other hand strictly by the number of plainly declared cases. These are not for the most part acutely fatal but so cling and linger and recur as to deduct largely from the health, comfort and resources of the people. Besides they often leave a lowered vitality, or organs permanently embarrassed, so that their record is mingled with that of other diseases or registered in a lowering of the average vital power and labor capacity of the citizen.

Science and experience have so clearly indicated the attendant circumstances of this infection, the conditions under which it acts and remedies not only curative but preventive, that the prevalence is all the more the pity.

There can be no doubt that in certain states of atmosphere, as to heat and humidity such miasms are more active at one time than another. But if only proper drainage is secured, proper precautions exercised by individuals and families, a proper preventive taken, it is in our power to largely abate the nuisance. Already in our own State some advance has been made by the extended drainage of one or two localities.

Our character of soil, the situation of our water sheds and water courses, the massing of great cities toward tide water, and some other considerations, point to the need of more active attention to this subject.

Where cities and railroads are building and new avenues opening there is not only neglect of drainage but aggressive disturbance of ground arrangements favorable to proper water delivery. Hence, while so well able to avoid, no State is more likely to accumulate the causes of malaria or to interrupt by art provisions once well secured by nature.

There is also especial interest attaching to the fact that in the case of the malarial fevers it is known that not only by drainage and precautions, but by the use of certain articles for the individual we may prevent the manifestation of the disease.

This means that by preventive treatment of the person we are able to put in the blood or tissues a something which somehow interferes with the action of the infective particle either by destroying it, by suspending its activity or by so fortifying the system as to render its efforts unavailing.

If this be so, the question very naturally arises whether in regard to other infective material we may not somehow be able to place within the blood or tissues some substance interfering with its supremacy, and thus abort the infection.

Scarlet, yellow and other fevers, as well as diphtheria, measles, erysipelas and allied diseases have hopeful prospects in this direction.

Some of our greatest studies in the political economy of the future will be as to this and other methods of limiting disease.

Diphtheria still continues to recur as an endemic or local outbreak in various portions of the State.

We are not yet able to speak of its causes with that definiteness which is desirable.

It is a disease of country districts even more than of large cities. Although it is spread by infection, it is not apt to become malignant unless warmth and moisture are able to find animal organic materials for its fertilization or dissemination.

Separation even at a short distance, careful ventilation and the avoidance of water-wastage or dampness within buildings do much to aid in the limitation of the disease. It is being carefully studied by physicians, engineers and sanitarians, and by isolation, cleanliness and disinfectants, we are able more than formerly to abate its ravages, where we can secure the employment of known methods. We note with interest that under the patronage of the Sanitary Association of this State, a survey is being made of Paterson, Jersey City and Hoboken, and the most of Hudson county. Geological structure is carefully mapped, and each house noted in which death from diphtheria or other infectious diseases has occurred. Already some facts of value are elicited. Our returns of vital statistics as they will be secured by the law at present in operation, will greatly aid in the study of epidemics.

The Board so soon as it shall have secured accurate data hopes to study both periodic fevers, diphtheria and other diseases with that careful analysis which their frequency demands, and which numerical methods so greatly aid.

The attention of the Board of Health has been called to the prevalence of typhoid fever in Montclair, and in the Reform School, at Jamesburg, beside the occurrence of isolated cases in various portions of the State. This has been called a disease of civilization and of modern improvements because its causes are so often and distinctly traceable to man and his own artistic appliances and conveniences.

This little brief from some citizens of Montclair sufficiently outlines the outbreak there:

"A report having gained wide circulation that Montclair has been during the past season the scene of an alarming epidemic of typhoid fever, we desire to present the facts on which the report above named was based. The disease had its origin in a

small house on Park street. The family occupying this house sold milk. The well which was near the house contained filthy water. The cellar contained various kinds of uncleanness. All the cases of typhoid occurred in the families supplied with milk from this house. The typhoid poison in some way (probably through the medium of the well water,) found its way into the milk, and was thus distributed through the neighborhood. The whole number of cases which presented typhoid symptoms was thirteen, the majority of them being very light. There were five or six severe cases and three deaths. The disease was confined to a very small locality, and did not, at any time endanger those living beyond its immediate influence. It was never in any sense epidemic in the town. Montclair has an area of seven and a half square miles, and a population of about five thousand; it occupies an elevated position, its average height above the sea level being about three hundred and fifty feet, and its highest point about six hundred and fifty feet; it lies on the easterly slope of Orange Mountain, the land having such inclination as to afford almost perfect drainage; it is remarkably free from malaria, and is in a general way a very healthy place. The death rate last year was less than nine per one thousand inhabitants—a better exhibit than is shown by the healthiest town in Massachusetts. (See report State Board of Health, 1877.) Typhoid fever is a disease of very rare occurrence. At present there is not a single case in town, and we can assure our friends that there is no cause for anxiety on our account.

"William A. Torrey,
"Thomas Russell,
"Chas. L. Benedict,
"J. J. H. Love, M. D.,
"J. W. Pinkham, M. D., etc."

The epidemic at Jamesburg was directly brought to the attention of the Board by the Trustees, and a thorough investigation made thereof. As a part of our report will be found a paper as to it. If the occurrence were exceptional or accidental, it would be of only passing interest. But there is good reason to believe that many cities and multitudes of private houses in this State are busy accumulating just such sources of infection, either

showing their effect by a general loss of vigorous health, or likely at some future time to declare themselves by a deadly outbreak.

The locality especially illustrates how a porous soil, of sand and gravel with an impervious clay several feet below may be able for a long time to rid itself of all organic material, but finally so fail as that wells and houses become impregnated with the products of decay. Many towns along our seacoast are filling up rapidly and have not as yet suffered. In their formative periods they give fine advantage for sanitary foresight and construction, while future prospects warrant plans in accord with the best scientific practice. But most of them rely on opinions not expert, so far as sanitary advice and execution are concerned, and are "dabs of sanitation," well advertised as of the most approved methods. The health resorts of England have recently been the subject of several important reports which should warn and instruct us as to the value of prevision.

Evidence both in Europe and our own country has now accumulated sufficiently for us to affirm that fevers known as typhoid, cesspool, etc., and depressions of health vaguely called malarial, are mostly the result of air, earth, or water contaminated by the confined and retained excretions incident to our habits, to house-life or to crowdings of population. Disease is not so accidental and inexplicable as once supposed. It is generally not a mishap, but is providential that mankind, chastened for neglect and warned into a higher regard for natural laws, may secure a higher development.

Our attention as a Board has been called to some private nuisances and infringements upon private rights. Under our present laws there seems to be no available remedy if a neighbor fouls the well of an adjoining lot by placing his out-door conveniences in closest proximity to it. In a case investigated by a member of the Board, the water supply of a small village is very seriously interfered with by embankments made on public works, and in the opinion of most of its citizens there has been an increase of sickness since. A brief report thereupon is herewith transmitted to you. We can point to localities in our State where, by such constructions, the water level has been made much higher and lands made wet and boggy, which before had fair natural drainage. The remedy for these in-

fringements upon private rights must be chiefly furnished by those who fully comprehend the equities of public and personal rights, and who know how technically to frame laws so as to meet all contingencies.

OFFENSIVE TRADES.

During the past years the Local Government Board of Great Britain has published an important investigation into offensive trades and the best methods of conducting them harmlessly. Our own State suffers much from offensive factories, moved out upon it from adjacent cities. These are important industries, but there is no excuse for their being so great an evil to the surrounding vicinage. With a proper outlay science and art now demonstrate how they may be rendered innocuous, and even the odors fully abated. Where such is the case the fact of the nuisance is still more inexcusable, and should be reached by the restrictions of law.

REGISTRY LAW AS TO VITAL STATISTICS.

The Board regards the new law as to the registry of marriages, births and deaths a most important one in the interests of the population, and for the progress of sanitary reform.

There are some slight modifications of the law which will add to ease of administration without weakening its efficiency. It has so important a bearing, not only as a legal registry, but as a guide in vital concerns, that there should be close adherence to the judgment of those who have thoroughly studied the science and art and utilization of vital statistics.

This is in charge of the Department of State, but its medical supervision is under the advisement of the Board of Health. When due provision is made for the clerical force needed in dealing with the large aggregate of returns, we shall be able to gather from them more valuable data and to trace with more exactness the localities, causes and outspreading of disease.

The inconvenience unavoidable in any radical change of method has been found much less than anticipated and we have concurrent testimony as to its general success. The return of marriages and deaths will show a large increase. The birth re-

turns will be less complete in numbers until the duty is enforced, but are of far more value, and in some districts these also show a large increase in return of numbers. Many of our physicians make their returns with business accuracy and promptness and especially those who rank highest in the estimation of the profession.

The law has brought the Board into correspondence with all the cities of the State as well as the townships, and has secured returns from every township and every city. It also corrected a limiting amendment in a former law by giving the State Board power of inquiry in all matters pertaining to the public health alike in city and country.

As to those whose duty it has been to make retnrn of marriages it must be said, that with many oversights and neglects, the former law was nevertheless so carried out as to be of service as a record if not as a basis for vital deductions. Clergymen, Justices, etc., not only were not paid for their certificates, but besides were compelled under penalty to pay twelve cents for each record they have made at the county seat. The present law is much more convenient, involves no expense, and secures fuller returns at less cost to the State. We have heard no complaint from this class, but are rather indebted for some suggestions in perfecting blanks.

Neither as a rule do the educated class of practitioners object to making their returns without special compensation. Their practical exemption from all jury duty is a deliverance which to the most of them is a boon quite equivalent to the two or three hours a year spent in filling out blanks.

Still more when the duty is conceded to be imperative and a honorarium in most countries, and in 1874 was made the general law of England under the sanction of the most eminent members of the Royal College of Physicians and Surgeons, and has been accepted in most cities of our country, objections should be exceedingly strenuous and demonstrative to lead us to substitute our personal views for those of the profession. The present State Board argued this point with some of the fairest legal minds of the State. They were not slow in perceiving what physicians ought to perceive for themselves, that all such exactness of method and record of the results of practice is always in the common interest of the profession it concerns. There are always in every

liberal art duties which do not admit of exact pecuniary reckoning and compensation, yet which performed always accrue to the welfare of the givers, and so each really becomes a sharer in a general pecuniary reward.

The law assumes that there is or ought to be skilled attendance amid the perils of disease and birth, and makes it as it really is, to the interest of every one in such peril to have responsible attendance. While there have been many views as to methods of tabulation and the details of forms, we have never known a careful study of the subject to leave in doubt those who thus got thoroughly before their minds the entire facts in evidence. A reasonable comment on the tendencies to respond to such a view has been furnished by the fact that the best returns are now found in those places where a strict system was already in operation or where it is entirely new. The greatest difficulty has been experienced in towns where by reason of slackness in former administration, a neglect of ordinances had come to be felt excusable.

While the law does add some additional care to undertakers, yet it is to be remembered that any one else may obtain the permit as well as themselves and the obligation put upon them to be assured of its securement is much easier than that system of undertakers' license which is sometimes required.

We do not need, we think, in this State to discuss the necessity of such a law. It has been upon our statute books from our earliest legislation; has received from time to time amendments and some improvements. In the meantime other states and countries, so far from undervaluing, have inclined to make vital statistics the starting point for all statistics as to material conditions, and have largely increased the facilities for their securement. Still more have they become a part of those studies of population now considered vital to the interests of every nation. It is well known that the leading agency in the great work of state sanitary reform in Great Britain has been the Registrar General's Department, and that to it as a guide the Local Government Board has looked in all its more important measures for the welfare of the people. The same must occur in every state as in every profession where the study of the preservation of health is recognised as a weighty public concern.

ADULTERATION OF FOODS.

The attention of the Board has been invited to adulteration and impurities of food, drinks, medicines and illuminating oil.

In times when we are very properly concerned over the interests of labor and the depreciation of compensation and employment, it is well to remember that the wages paid is not the only test of value. It is an important question whether the laborer in return for his money receives an equivalent of such material as his money entitles him to, and as aids him in his work. There are certain protections against adulterations and against dangerous articles on sale and in necessary use, which the individual cannot secure for himself and which must come through the warnings and penalties of legal enactment. The compositions of breadstuffs, of artificial butters and cheese, the condition of slaughtered meats and of liquid foods, the risks in canned fruits and artificial drinks, the value and the safety of burning fluids, all these and such like matters must be inquired into and guarded by the State. An article in one of the leading journals speaks thus:

"There is a demand for severe legislative enactments against the adulteration of food. This is indeed a subject well worthy of the attention of legislators. The wretch who adulterates articles of food is nothing but a poisoner and should be treated as such. This country is certainly blessed with an abundance of cereals, dairy products and meats. While we export enormous quantities of these products to Europe, we often forget that inferior and adulterated food is sold to our own people by unscrupulous dealers. We are all familiar with the operations of the skim milk dealers. While in New York and other states such persons can be brought to justice, we do not know of a single statute in New Jersey which reaches the adulteration of food of any description. It is true that in some of our largest cities we have meat inspectors, and occasionally these functionaries will seize a piece or two of meat unfit for use, but here the matter rests. Oleomargarine can be sold for butter in this State without punishment, sawdust for mustard, marble dust and powdered lime may be found in large quantities in our flour barrels, and the skim milk dealer may carry on his nefarious, yet murderous

trade without fear of molestation." Our laws as to all these are imperfect.

A member of the Board has been appointed to make special inquiry as to food adulterations.

ILLUMINATING OILS have, the last year, enforced the need of some legislation for protection from accidents therefrom.

The press of the State has recorded a large number of accidents. In Newark two persons were burned to death in one week, and similar accidents have been of no infrequent occurrence elsewhere. The November number of the *Plumber and Sanitary Engineer* says: "We began some three months ago collecting such notices of kerosene accidents as we found in the daily papers of this city, but they have accumulated so fast that we cannot publish them *seriatim.* Thus far from our incomplete collection, we might furnish our readers with names and residences of ten unfortunate women burned to death, and men and women badly injured and a large number of fires caused by it. These damages are assessed from $40,000 down. When in search of information about some of the cases in the coroner's office in Brooklyn, we were informed that the oil causing these accidents was frequently or generally above the legal standard."

"It is ascertained, with a reasonable degree of certainty, that about seven thousand persons are slaughtered and six thousand seriously wounded annually in the United States by this deadly fluid. In addition to this, the loss of property reaches into the many hundreds of thousands of dollars. This need not be so, and should not be so. The law should fix a standard test which will insure safety beyond peradventure, and provide the severest punishment for the manufacturers and vendors of explosive kerosene. The State owes it to her citizens to protect them from such great danger.—[*Cincinnati Price Current.*"

The inquest March, 1878, on the body of Catherine Foley, of Jersey City, whose death resulted from the explosion of a kerosene lamp, showed in the expert testimony that what is admitted as strictest refined petroleum by the rule of the New York Produce Exchange is not always safe, although answering to the "burning or fire test," it does not come up to the flashing test.

Prof. H. B. Cornwall, of Princeton, has given much attention, as have various other chemists, to the testing of specimens, and has kindly furnished us these notes, which are more important and conclusive than any mere statements.

NOTES ON KEROSENE.

Kerosene is made from petroleum, which contains several different compounds of carbon with hydrogen. The petroleum is heated in stills, and the very inflammable and volatile liquids which at first are condensed are known as gasoline, naphtha and benzine. Any of these give off at temperatures below 100° Fahrenheit, gases which are very easily ignited and form with air explosive mixtures. After these have been driven off from the petroleum, the kerosene is collected, and if the refiners begin to collect the kerosene from the condenser of the still too soon, it will also contain more or less benzine or naphtha. It is the presence of these in badly refined kerosene which renders it dangerous, because they pass off from the kerosene as gases at very moderate temperatures and in dangerous quantity. If the dealers put benzine or naphtha into good kerosene the result is the same. It is not possible to say certainly whether the injurious ingredients have been left in the kerosene by the refiner or put in by the dealer. Since naphtha and benzine command a much lower price than kerosene, there is a great temptation to sell kerosene containing them.

The quality of kerosene can only be practically ascertained by what is known as the "*flashing test.*" The kerosene is put into a glass vessel holding somewhat less than half a pint and filled nearly to the top. This glass is placed in a metal vessel of water, so that the water rises as high outside as the kerosene inside of the glass, and the water is then slowly heated by a small flame under the metal vessel, currents of air being shut out by a detached screen. By means of a thermometer, whose bulb is just immersed in the kerosene, the temperature of the oil is observed. At every increase of two degrees or so in the temperature the oil is well stirred, the gases are blown from its surface and after a moment or two of rest a very small flame is passed steadily and rapidly across the oil, *not touching its surface*, but at about one-quarter inch distance. If a blue flicker-

ing flame flashes transiently across the oil it shows that *the temperature has been reached at which the oil gives forth inflammable vapors.* This is called the *flashing point.* Since it is the gas thus given off which, mixed with air and ignited by the lamp flame or otherwise, causes the explosion and since, further, an oil heated to this point, if spilled near a light by any chance, such as the upsetting and breaking of a lamp, will be at once set on fire by the ignition of the gases escaping from it, it follows that no oil is safe which gives off such gases at temperatures to which oil is ordinarily exposed in common use.

Dr. C. F. Chandler, of New York, has shown that the average temperature of the oil in thirteen glass lamps, after burning some time in a room of which the temperature was from 90° to 92° Fahrenheit, was 92½° Fahrenheit, while the oil in one lamp showed a temperature of 98° Fahrenheit. Any oil that will not stand the flashing test at 100° Fahrenheit is manifestly liable to cause accidents by explosion of gas from the oil mixed with air in the lamp.

A common cause of accidents is the breaking of lamps. It has been shown (*American Chemist, June, 1876,*) that when a lamp containing oil at a temperature of 95° Fahrenheit is lighted and broken by dropping on the floor, oils which flash below 100° Fahrenheit will at once take fire from the gas which is ignited by the wick, while oils that stand a flashing test of 100° will be ignited but very slowly if at all; those which flash at over 105° to 110° not being ignited unless by *actual contact of the burning wick with the oil.* It is, then, the gas from the poor oils which takes fire from the lighted wick of the broken lamp and causes the instantaneous ignition of everything on which the oil has fallen.

It is unfortunate that any other test for oil has been introduced, but most oil is sold by another test, viz: the *fire test,* which means the temperature at which the oil itself takes fire from the ignited gas and continues to burn, when tested in the glass vessel, as above described for obtaining the flashing point. This *fire test* is fallacious, for it is not invariable. While one oil that stands a *fire test* of 110° may stand a *flashing test* of 100°, another of 110° *fire test* may *flash* at 80°, and it must not be forgotten that it is the escape of inflammable gases at a low temperature which occasions all of the danger in ordinary cases.

What constitutes a safe oil? Probably it would be desirable to make the *flashing point* not lower than 110° Fahrenheit, to ensure perfect safety, but since this entails a considerably reduced production of kerosene from a given amount of petroleum, it may be regarded as settled that a *flashing point* of 100° Fahrenheit will be a much more easily procured standard, while it will secure undoubtedly a reasonably safe oil.

I have examined five kerosene oils that actually occasioned explosions in this State, the lamps being burst, not broken by upsetting. They showed the following *flashing* and *fire tests*:

	FLASH TEST.	FIRE TEST.
No. 1	79° Fahr.	99° Fahr.
2	76° "	85° "
3	82° "	106° "
4	84° "	105° "
5	94° "	111° "

These figures show that every oil flashed below 100° Fahrenheit, although three had a *fire test* above 100°, one, No. 5 at 111°, being *one degree better than standard kerosene of the New York Produce Exchange.* It is most unfortunate that this *fire test* was ever introduced. It means nothing, it confuses the public and it has furnished the means for evading the just penalty of the laws against the sale of dangerous kerosene. Many States have adopted 100° *fire test* as the lowest limit, but it has been repeatedly proven and is well known to all who deal in kerosene, that a 100° fire test oil *must be unsafe under all circumstances.* The *flashing test* is the only safe one. The statements of prominent refiners support the view that a 100° flash oil while reasonably cheap is reasonably safe. I have never met with a case of an accident from such an oil.

Experiments show (*Amer. Chem. loc. cit.*) that an average poor oil, flashing at 86° Fahrenheit, can be brought up to the safe 100° flash test by removing six or seven per cent. by distillation, and Mr. H. N. Rogers, of Chas. Pratt & Co., informs me that an oil of 110° *fire test* would yield about eight per cent. less of a 100° *flash oil.* At eight per cent. greater cost, at most, the ordinary poor kerosene could be made safe, and the oils would still burn just as well in ordinary lamps. At present these safe

100° flash oils are rare have examined fourteen ordinary kerosenes in one day and only found four good ones. There are a number of safe, high grade oils in the market, flashing at 110° to 125° Fahrenheit, but they are necessarily higher priced, because the demand for them is small in comparison with the cheap, bad oils. If legislation forced the production of safe oils alone, these still safer oils would become cheaper.

The eight per cent. removed from the kerosene by distillation is not a dead loss. It still has a value, although less than one-half as great. Even if a dead loss it would now be only one cent a gallon. The gain to the community by freedom from danger to life, person and property, and the gain to the refiners and dealers by increased sales of a commodity no longer regarded as probably dangerous, may be offset against the former loss. I hold letters from prominent refiners stating that they greatly desire legislation to improve the quality of kerosene. The insurance companies would probably say the same.

Of the five oils described a few pages before, three caused fatal accident, and two would have caused fires had not fortunate chances prevented. They are fair types of such occurrences, taken just as they came, the only source of information in four cases being one New York paper. How many similar accidents occur in the whole State in a year I do not know, but certainly enough to make the question an interesting one to the Board of Health.

Any legislation on the subject must be decisive and must provide a penalty and means for enforcing it, on refiners as well as dealers. Several States have excellent laws; several have useless ones. The law of New York State is useless, with its 100° *fire test;* the law or ordinance of New York city with its 100° *flash test*, has done a great deal of good. Common people will have the cheapest; they will burn *pure benzine* if it is cheaper than kerosene. I tested one sample which killed a girl in Jersey City. It was simple *benzine*, and worse than gunpowder.

I add a list of oils I have tested:

	FLASH TEST.	FIRE TEST.	
No. 1	78°	....	
2	104°	120°	
3	81°	....	
4	82°	....	
5	80°	98°	
6	79°	104°	
7	101°	....	
8	99°	116°	
9	77°	100°	
10	104°	....	
11	115°	127°	Sold as Pratt's Astral Oil in Princeton.
12	83°	....	
13	80°	....	
14	79°	99°	Exploded in a hall lamp and nearly set fire to the house. The lamp was nearly full and burning quietly.
15	86°	107°	
16	94°	111°	Exploded in a lamp quietly burning and nearly set fire to the house.
17	118°	135°	Pratt's Astral.
18	80°	100°	
19	98°	112°	Vesta Oil.
20	99°	112½°	" "
21	127°	149°	Home Light Oil.
22	128°	148°	Anchor Safety Oil, Princeton.
23	142°	154°	Anchor Safety Oil, five months later.
24	76°	85°	Exploded in lamp when blown out, and killed a woman.
25	119°	139°	Pratt's Astral, Princeton.
26	82°	106°	Exploded after burning some hours and killed a woman.
27	84°	105°	Exploded in a kitchen and killed a woman. No fire in the vicinity of the lamp.

The danger of the oils flashing below 100° Fahrenheit; the uselessness of the 100° fire test, and the very common use of bad oils, are sufficiently shown by the above list. As regards the high grade oils it should be added that a small dealer in New York city told me he filled Pratt's and other marked cans with *any good oil!*

It is certainly time that our State should have definite legislation on the subject, both in the interests of life and property.

The whole matter of adulteration of food, drinks, artificial lights, etc., is so important that we believe our legislators should at once enact such a law as will protect our citizens from imposition. If also provision was made by which the State Board could employ one or more public analysts, at a very moderate expense, society would be largely protected from the daily impositions practiced. We commend the subject to the careful attention of your Excellency and the Legislature, and are ready

when called upon to aid in any method which will accomplish the purpose.

As a part of this report we beg leave to present to your Excellency as follows, several papers, which we believe will be found of much value to the citizens of this State, and will aid to guide our legislators as to some of the best methods of conserving the public welfare.

I. Report of State Board of Health at the Governor's request, "On the disposition to be made of the criminal insane."

II. Report on an outbreak of enteric (typhoid) fever at the State Reform School, Jamesburg, by E. M. Hunt, M. D.

III. A report on the diseases of hatters, by L. Dennis, M. D.

IV. A paper on springs, wells and cisterns as sources of drinking water, by Professor H. B. Cornwall, Ph. D., Princeton, N. J.

V. A paper on sewers by E. A. Osborne, C. E.

VI. A paper on vaccination, by E. J. Marsh, M. D., President of State Board.

VII. Outline of the work of the New Jersey Sanitary Association, by E. M. Hunt, M. D.

VIII. Veterinary report, by J. C. Corlies, D. V. S.

IX. Report on interrupted water supply, at New Village.

X. Climatology.

XI. Report of vital statistics to June 1, 1878.

I. At the request of your Excellency that we would inquire into "the proper disposition to be made of the criminal insane," the Board appointed two of its members to make careful examination into all the evidence they could command.

Diligent investigation led us to the views expressed in this report, and met the approval of the Board. While it is a subject admitting of a diversity of opinion, it needs to be more fully studied by philanthropists, physicians and alienists. We are convinced too that our State charities and penal institutions, while well superintended, need to be strictly compared with those higher laws, the neglect of which does not indicate mal-administration, but the studious recognition of which might make them more useful for reformatory, educational and economical purposes. System so easily degenerates into routine, that what is

conservative is easily reckoned as radical by those who have not re-studied the great questions of insanity, pauperism and crime, and the management of their victims by the light of modern methods of inquiry and practice. They are great personal, civic and State interests and ever need most earnest supervision.

II. The report on the outbreak of enterie fever at the State Reform Schocl, Jamesburg, is in itself so forcible an illustration of what may happen from faulty construction or concealed embarrassments under able superintendence that it is valuable as a warning and incentive, to secure a prevention or correction of similar evils in many a public and private residence of the State. We are glad to bear testimony to the earnest efforts of the Superintendent and Trustees to secure an improvement of inside apparatus, sewers, water supply, etc., as rapidly as the limited funds at their command will permit.

III. The report on the diseases of hatters is but one of very many reports needed as to various industries. It is but a specimen of what evils may result in various trades and occupations. The most of these are avoidable. Even where deleterious substances have to be used the provisions of chemical and pneumatic art are such that the workmen can generally be protected from harm. Our State has large manufacturing interests in iron, pottery, glass-blowing and many other trades especially subject to enervating influences. At one time capitalists looked with suspicion upon any effort to improve the condition of working-places or methods having regard to the health of employees, as they might entail expense upon employers. Men of narrow views may still be found who secretly, if not avowedly have these groundless fears. Our ablest and most successful manufacturers are coming to know that the health and comfort of the skilled workman is a part of their own success. He who summons the artisan to his aid for executing an art from which he expects to receive reward, should see to it that his laborers can do their work free from all unnecessary perils to health, life or cheerfulness. If not it is the common interest of the State and of every citizen in it to strive to secure such a result. This report important as to one class, will be of still further service if it will awaken attention to the avoidable exposures in various de-

partments of industry, with a view to their remedy or abatement.

IV. The paper on springs, wells and cisterns as sources of drinking water specifies the qualities of good water, precautions against impurities and furnishes an outline to guide all householders against the evils which so constantly result from a contaminated water supply. We are able thus to present in condensed form instructions which need to be heeded by every citizen of the State. The evils of bad air, imperfect food and impure drinking water are sometimes manifested in sudden outbreak of disease, but more frequently in a general lowering of the standard of health. There is help to society and great comfort to the individual in deliverance from all avoidable burdens.

V. The paper on sewers will be found to present methods of construction and other points of great importance to cities. Evidence is constantly accumulating as to the evils arising in cities from these underground conveniences and even from the drains and cess-pool connections of private country houses. There is need that the attention of our citizens be carefully directed to the subject.

VI. The subject of vaccination is so important that we cannot too earnestly call attention thereto. The evils of small pox and the value of this protection are sufficiently well known. So long as we were dependent for our supply of vaccine upon matter taken from others, some had a fear of the transfer of human diseases. Some physicians believed in the very rare possibility and so this was a fear and with some valid and plausible reason might lead to hesitation. Since now we can avail ourselves of the vaccine virus direct from the cow no objection founded on risk of the transfer of bad blood can stand. It is the plain duty which every citizen and every child owes to every other that the risk of the small pox contagion should thus be well nigh abolished. Many countries now have and enforce a law of compulsory vaccination. Many claim it as applicable here. Still more claim that when we offer the public school as a gratuity we have the right to make vaccination a condition of entrance. Even if we trust to the voluntary plan, with our

present school system of yearly enrollment, and with the aid of our system of vital statistics, it would not be difficult to ascertain each year how many children over a given age are unvaccinated.

Nor would it be difficult whenever public opinion or intelligent legislation request it for the Educational and the Health Board so to co-operate as that inexpensive and reliable vaccination might be secured to all district schools at some period of the year. We are able to suggest a plan by which such a satisfactory result could be very generally secured.

Other matters are fully treated in the paper which forms a part of our report.

VII. During the last four years there has existed in the State a sanitary association of citizens. Its yearly meetings bring together persons of various callings who feel a deep interest in the health of our citizens, and recognize, both in city and country, avoidable causes of disease. Papers of permanent interest, which have never been published, have been read by physicians, teachers, engineers, etc. As valuable extracts could be made therefrom, this outline has, by permission, been prepared for this report, in order that our citizens generally may avail themselves of the most important suggestions. This is but a mere synopsis of the chief contributions. These and the other papers can be consulted in manuscript.

VIII. In accord with the direction of the law, that the Board should "make inquiries and report in reference to diseases affecting animals and the methods of their prevention," we have, from the date of our organization, noted the most common diseases and the efforts of veterinary medicine in its cure thereof.

Two facts soon became apparent. The descriptions of disease as reported were too general to admit of indentification, and the professional education of most of those practicing among animals in New Jersey has in the past been so imperfect as to leave us with but few sources of information. Veterinary medicine and surgery has long since taken rank as a profession collateral to that which cares for the human kind. In each experience is of great value, but it is that experience which is acquired on the foundation of careful study and exact scientific

knowledge. A correct practice can only be the outgrowth of such methods as are applied to other arts which have a science as the basis. Much of our cruelty to animals is in that promiscuous treatment which they receive when sick, or that want of sanitary care which induces disease.

While there has been some general inquiry as to epidemics or endemics among stock, and an occasional contribution on the subject, no systematic effort has been made to trace the prevalent diseases in our State, or to record such facts as might aid in their investigation.

More recently several graduates from the New York Veterinary College have settled in New Jersey, and these, with the very few reputable practitioners previously here, afford a hopeful nucleus of information. While the opinions of stock raisers and those who have to do with animals is to be noted, just as every good physician listens inquiringly to the statements of nurse or parent, yet there can be no hope of skillful management until men, well trained in this department, make of it both a study and a practice.

We procured the names of those who were best authenticated, and after consulting prominent members of the State Agricultural Society, invited Dr. A B. Corlies, Veterinary Surgeon of Newark, to co-operate with the Board in its work. The plan is to place ourselves in correspondence with some proper person in each county or township, so that knowledge of any outbreak may promptly come to our notice and the character thereof be duly traced. Some advance has already been made in this direction, and a few notices of special cases will be found in the paper herewith transmitted.

In the introductory it was thought proper to give soms descriptions of the diseases of cattle and horses most to be dreaded or which have already appeared in the State. These, although brief, will serve to guard against their introduction and to acquaint dealers in stock with their general character. We shall hope in future reports to deal more closely with the diseases in our own State and be able to designate methods for the better care of this great material interest.

IX. The report on interference with the water supply of New Village, was prepared in reply to a petition made to the Governor

of the State, and signed by about thirty persons, which we think included over three-fourths of the male citizens of the town. The facts of their petition were fully confirmed by E. A. Osborne, C. E., who made a survey of the locality. The evil still remains, because persuasion has thus far failed, and there is some doubt whether any provision on our statute book reaches it. But it is of value as illustrating a defect such as exists as to many other matters. In a good government it is often necessary in health interests to give plenary power and then confide in the judgment of the persons intrusted. Far more liability of assault upon private rights and public welfare accrues from delayed remedy or defective power than from peremptory jurisdiction when the parties exercising it have both character and position at stake, and would be compromised by a mistake of judgment or by undue severity under conferred powers.

X. The importance of climatology and the study both of meteorological and telluric phenomena is fully recognized by the Board. The relations of heat, air, winds, moisture and of sudden changes to the public health is undoubted, and has its ascertainable laws. The subject is a difficult one and for this reason all the more it needs that patience which can wait for results and that extent of observation in different States and localities by which a mass of information may be secured. Returns are kindly furnished us by the Signal Service Bureau, which has five stations along our coast, with an earnest request for similar returns from observers in the State. Other observations are made at several points in behalf of the Smithsonian Institute.

As the instruments for observation are expensive and the work is valueless unless it is accurate, the Board has deemed it wise to place instruments for the present at a northern and central portion of the State, as Cape May, with its Signal Station, represents the most southern latitude. The instruments placed at Princeton will be under the supervision of Professor Brackett, and the one at Newton in charge of Dr. Haven, the Librarian of the Dennis Library.

Observations were not commenced until Fall, and no report is made therefrom for this year.

Professor Brackett and E. A. Osborne, C. E., are a special com-

mittee to oversee the conduct of this work and aid will be secured from our ablest observers.

We are this year again indebted to Hon. Wm. E. Whitehead, of Newark, the veteran observer of the State, for his perspicuous meteorological tables. We call also especial attention to the comments thereupon contained in his monthly letters.

Special attention is called to his July letter, all the more important because of certain meteorological conditions coincident with the epidemic at the South and which have been carefully noted at Memphis, New Orleans and other points.

After remarking that the meteorological phenomena of the month were at variance with previous experiences and new at least to the present generation, he says:

"July was, in some respects, an exceptional month. The extreme heat, which lives in the remembrance of all, commenced on the 27th of June and continued with only slight modifications, on some days with increased intensity, to the 10th of July, the mercury rising every day above 90° (on three of them above 95°) making *fourteen days in succession* thus characterized. The largest number previously recorded in any one of the thirty-five years covered by these reports was *seven* in July, 1845. There were *five* in August, 1853, July, 1854, and July, 1856; *four* in July, 1843, June, 1848, June, 1849, July, 1866, July, 1872, and July, 1877; but, generally, only two or three in succession have been experienced.

"Although there was only one inch of rain fell during the whole fourteen days, and that on four different occasions—on 4th, 8th, 9th and 10th—yet there was so much humidity in the atmosphere that nothing like the ordinary effects of drouth were apparent, but it was conceded that that humidity added to the number of victims to "sunstroke," which was unusually great, especially in some of the western cities.

"On the afternoon of the 11th some welcome clouds obscured the heavens, and in the evening rain set in, which continued to fall in showers during the 12th to the depth of an inch and eight-tenths; so lowering the temperature that the maximum of the day was only $73\frac{1}{2}$°, and the mean temperature $71\frac{3}{4}$°, the lowest recorded until the 30th.

"The force of the caloric wave was, however, not yet exhausted.

On the 15th 93° was attained, and on the 18th, 19th and 20th, 97°, 97½° and 94° respectively, the 19th having the highest mean of the month, 86¾°; for although the maximum of the day was three-fourths of a degree less than was experienced on the 3d, the minimum, 76°, was higher than on any other day of the month. After the 20th the heat, although on some days very oppressive, was not so great, 90° not being again reached. Light clouds during the morning of the 29th culminated in the afternoon in others of greater density, effectually obscuring the eclipse of the sun, which had been waited for with much interest, and bringing a copious rain of nine-tenths of an inch during the night and following day. The temperature of the last two days was in consequence materially lowered, so that the 31st was the coldest day of the month; the change working such a diminution in the mean of the whole month as to prevent its being exceptional in that respect, as it bid fair to be.

"As less than six-tenths of an inch of rain had fallen (on two occasions, 18th and 20th) since the 13th, the rain of the 30th was very acceptable, but the humidity of the atmosphere, notwithstanding the extreme heat, was a noticeable feature throughout the month, and consequently, at its close, there was no material diminution in the beauty of the emerald tints of the fields or the rich verdure of the trees—with the exception of those of the paper-mulberries and horse-chestnuts, the leaves retaining a firm hold upon the parent stems.

"The month's mean temperature, 78.25°, exceeded that of all but one of its name during the last thirty-five years, and was four degrees and six-tenths above the average of the whole number, which was 73.65°. The mean of July, 1876, was 78.31°, a fraction higher than the last. The other hot Julys of the series were, 1856, 76.07°; 1866, 76.08°; 1872, 76.79°; 1877, 77.86°. The month was exceptional in the number of days having a temperature of 90° and over, fourteen being thus characterized; the greatest number in any previous July having been ten in 1876 and 1877. The maximum temperature of the month, however, was exceeded in four of the series, 1843, 99¼°; 1849, 99¾°; 1866, 98½°, and 1877, 99°. Its minimum, 61½°, was above the minima of all but that of 1872, which was 62½°.

"Opinions were expressed in some quarters during the month

that the heat was not so oppressive as in July, 1876. One fact connected with that month may have led to that opinion. The nights of July, 1876, were warmer than those of July this year by two and a half degrees, so that there was less recuperative power derived from the rest they afforded, and the heat of the days consequently rendered more oppressive. The mean temperature of the nights of the last month was, however, more than three degrees above the mean of the preceding thirty-five Julys, having been exceeded by the nights of two only, 1872 and 1876.

"The observations of the Signal Service Bureau sufficiently demonstrated that the heated current which for two-thirds of the month swept over all the Eastern, Middle and Northern States, took its start far in the northwest, beyond the limits of the United States, moving southwardly and eastwardly with a speed that outstripped the winds; and although the question has been asked, 'Who can estimate the value of a fact?' yet in this instance it must be admitted that the fact elicited would be more valuable if its 'why and wherefore' could be determined But, notwithstanding the progress made in the science of meteorology in late years, it must be acknowledged that more is known of *effects* than *causes*. What were the peculiar circumstances from which were evolved the atmospherical phenomena that originated, and then set in motion, the heated elements, is not explained by the discovery of the region of their development. There are many philosophers, no wiser than Horatio, to whom the things of Heaven and earth are still mysteries unsolved. The time will come, however, as prophesied by Prof. Loomis more than thirty years ago, when the meteorological maps of the Signal Service, giving the condition of the elements daily throughout the whole United States, will show more definitely the origin of atmospherical phenomena such as we have recently experienced.

"The locusts were first heard on the 14th, about a week earlier than last year.

"The barometrical range was between 30.240 observed on the morning of the 12th, and 29.700 on the morning of the 22d, the mean of the morning observations being 30.041 and of those in the evening, 30.016.

"The thermometers gave the following results:

"Maximum temperature, 3d, 98¼°.
" Minimum temperature, 23d, 61½°.
" Mean temperature, 78.25°.
" Highest daily mean, 19th, 86¾°.
" Lowest daily mean, 31st, 67¼°.
" Greatest daily range, 1st, 27½°.
" Least daily range, 30th, 2½°.
" Mean daily range, 19.694°.

"The daily maximum temperature was once 98¼; once 97½; once 97; once 95¾; once 95½; nine times between that and 90; ten times between 90 and 85; three times between 85 and 80; once between 80 and 75; once 73½; once 72½, and once 69.

The daily minimum temperature was once 61½; six times between that and 65; thirteen times between 65 and 70; ten times between 70 and 75, and once 76.

"Fair weather prevailed equal to about eighteen days. It rained in measurable quantities on eleven days and sprinkled on one other, to the depth in all of 4.330 inches, very little more than the average of the month in thirty-five years, which was 4.283 inches, the greatest fall during that period being 8.535 inches in 1868, the least 1.120 in 1861.

"The predominant winds were from points between N. W. and S. W.

"W.

"Newark, August 1, 1878."

REPORT ON THE DISPOSITION OF INSANE CRIMINALS.

To His Excellency, George B. McClellan:

On the receipt of a request from your Excellency that the State Board of Health would express an opinion concerning the proper disposition and treatment of insane criminals in this State, the Board appointed a special committee to consider and report on the subject.

That convicts who have the misfortune to be insane are entitled to the same care and skill in the treatment of their maladies, as other persons of unsound mind, has not been under serious discussion in the present century. It has been settled also by almost universal custom that such treatment should be conducted in buildings having special arrangements and appliances suited to the peculiar cases of the sufferers in question.

The real question to be considered in our report is this:

Are there good and sufficient reasons why convicts who become insane should be treated or retained in hospitals or asylums separate from all other insane persons?

As the question in some of its aspects is not new it may be profitable to inquire how it has been treated in other States and countries where an enlightened and Christian civilization prevails.

The practice of the Continental nations is clearly brought to light in the following extract from Mr. Manning's report on lunatic asylums (1868):

"The almost complete absence of special provision for the criminal insane of all classes which exists on the Continent of Europe, is very remarkable; but it is in accordance with the opinions of the public, and of many of the most distinguished alienist physicians, opinions which have found expression in various pamphlets, and in papers and journals devoted to matters psychological. It is held that insanity should level all distinctions, that the great gulf which separates the convict from

the honest man is bridged over by insanity, and that the bondsman should be as the free; that when sick in body the prisoner should still be kept in his prison and treated for his malady; but when sick in mind the prison should be opened and the badge of the convict forgotten."

When we remember that many of the most valued writers and authorities on the care and treatment of the insane are to be found among the French and Germans, such language is very significant.

In Great Britain the case is somewhat otherwise, for we find at Perth, in Scotland, there is a "criminal lunatic asylum." It is a part of the general prison of Scotland, but yet is under the charge of a special superintendent. This asylum is not, however, in strictness one for insane convicts alone, since it receives as well those who have committed acts of a criminal character while under an insane impulse. The asylum, however, presents the character of an institution for a distinct class, aud this impels us to give in full, so far as relates to the subject, an excellent letter from its able medical superintendent, John McNaughton, M D.:

"SOUTHVIEW GENERAL PRISON,
"PERTH, 10th Sept., 1878.

"DEAR SIR:—I received your letter yesterday and have much pleasure in answering your questions so far as I am able.

"Our Criminal Lunatic Department consists chiefly of two distinct classes of inmates, viz: those who have been found by a court of law to have been insane while committing the crime charged, and therefore condemned to be detained as lunatics during Her Majesty's pleasure; and secondly, those who became insane during their term of imprisonment.

"Now with regard to the first class they, in the vast majority of cases are homicides, subject to more or less frequent homicidal impulses, in many cases with long perfectly lucid intervals between. With these we put all whose propensities are distinctly homicidal.

"For this class of criminal lunatics I hold that a separate institution upheld by the State is almost indispensable, as it confers on us the power, gives us the means, and holds us responsible for the detention of prisoners, though apparently perfectly sane,

so long as there is the slightest danger of any recurrence of the homicidal tendency, whereas if confined in an ordinary parochial asylum, the authorities, considering the generally crowded state of their establishments, and the desire to keep down the expenses, could hardly be blamed or held responsible for discharging a man as soon as he has again regained his reason.

"This argument applies very forcibly to one class of homicides, viz: dipsomaniacs, as those patients very shortly after confinement and the cutting off of the supply of drink, generally become perfectly sane, but they are not then, and I question very much if they ever can become fitted to be again allowed with safety abroad.

"Take another class of homicides, those who have committed murder through puerperal mania. We have power from the State, if thought necessary, to detain these women at least till after the childbearing period, which would not only be very difficult but almost impossible to do in our ordinary asylums, as now constituted.

"Now considering the second class, those becoming insane during their imprisonment. They are put here for treatment with homicides. If remaining so at its termination, we as a general rule transfer them to the asylum of the parish to which they belong, where they can generally be very well treated along with the other inmates. Even in those cases we have the discretionary power, through the Secretary of State, of detaining them at the expiring of their sentences, when we consider them unfitted for an ordinary asylum, but in very few cases do we require to exercise this power, as they are generally simple cases of insanity resulting from depraved moral and physical habits.

"Your next question, whether they incline to escape more than other lunatics? I cannot well answer, as ours are so confined as to prevent the smallest possibility of such an attempt being successful, and seeing its futility, none have ever, to my knowledge, made the attempt.

"Once a patient has been received into our Lunatic Department there is almost no inducement for him to feign insanity, rather the reverse, as he knows his chances of again being set at liberty entirely hinge on his mental state.

"In our ordinary Convict Establishment, for which I am also

medical officer, we have numerous cases of feigning insanity to escape punishment, or to be released from their imposed task.

"As a general rule, I should say, taking them as a class, our criminal lunatics are much more unmanageable than others, seeing they principally come from the lowest and most degraded orders, hence being naturally of a suspicious and jealous nature, with no curb on their passions to begin with, when insane, one can imagine they will take far more tact and a firmer hand to manage them than ordinary lunatics.

"Considering that over sixty per cent. of our inmates are homicides, attempts at violence are very much more common than amongst the same number of ordinary lunatics.

"I am sorry I cannot direct your attention to any literature which fully discusses the question of separate criminal asylums, but will be happy to give you any other information in my power should you desire it.

"I know of no other Criminal Asylums than those you name, although I am aware they detain lunatics for a certain time in Millbank Convict Establishment.

"Believe me, dear sir, sincerely yours,

"JOHN McNAUGHTON, M. D."

It will be seen from this that in his judgment, a separate provision for those disposed to homicidal acts, is fully as important as for those who are insane convicts.

An asylum of similar character exists at Broadmore, a few miles from London. It receives insane convicts from the government prisons, and also those who being found to have been insane at the time of the committal of a criminal act, are condemned to be detained as lunatics. Its entire management is similar to that of an ordinary English asylum. It has no special provisions for security beyond those which may be found in the best asylums in this country.

At the expiration of sentence, the rule is to discharge the convict insane and to remand them to other asylums.

The Irish asylum at Dundrum is of a similar character.

Fisherton House, near Salisbury, is a proprietary asylum, available, however, to parishes and county prisons, for the detention of insane paupers or insane persons convicted of minor offences.

While all these are worthy of study, giving as they do, some information respecting special classes of insane persons, none of them shows the result of entire separation of convicted insane persons from all others. Indeed the experience of the medical officer at Perth would rather show the need of providing for the care of other classes of insane persons before setting apart an asylum for insane convicts alone.

In the United States, notwithstanding the organized efforts of the "Association of Asylum Superintendents," we have as yet no separate asylum for the treatment of insane convicts.

In Massachusetts various attempts have been made to secure the separation of insane convicts from other insane persons; and the Legislature has passed votes favoring such a result, but nothing decisive has been secured in favor of separation, till recently. It is now ordered that insane convicts be treated at a hospital connected with a prison.

The new prison at Concord is to have a "special department adjacent to the prison, which will accommodate about thirty insane persons."

It so happens that on no point are our correspondents so unanimous as in discouraging the building of such an asylum or hospital near or in connection with a prison. Says one of the former assistants in the Auburn Asylum, who is now connected with the Insane Asylum at Danvers, Massachusetts, "I should especially urge the importance of not building too near a prison, as the environment is pernicious. Get the insane convict off a reasonable distance in the country, with plenty of farm work, fresh and good living, and not only would some good cures be effected, but there would also be many persons wholly reformed." Similar observations are made by the Superintendent of the Taunton Lunatic Asylum.

The nearest approach to an institution for the convict insane in our country is near the State Prison at Auburn. A large proportion of its inmates are, however, unconvicted insane persons. The asylum is placed on a lot of six acres—a part of the prison grounds—and is enclosed by a stone wall. The present Medical Superintendent very properly objects to its proximity to the prison. It was first occupied in 1859, and has had a varying and complicated history. It was originally intended for insane convicts only, but in 1869 it was made to receive those who had

been acquitted on the ground of insanity. It is worthy of note, however, that formerly "from one-third to one-half of the persons transferred to the asylums from the state prisons were certified by the medical officers of the prisons to have been insane when received into them, showing them to have been insane at the time of sentence." The following letter from the able Superintendent of the asylum is important :

"Respecting the propriety of confining persons whose insanity has led them to commit, or attempt, homicidal acts, I may say that, in my opinion, there are cases of this kind which it would be manifestly unjust to confine, in common with the *convicted* insane. The wife, for example, who destroys her infant during an attack of puerperal mania, or, in fact, any individual whose life, prior to the occurrence of insanity, has been exemplary or at least not criminal in character. In this State the statute wisely provides that 'when a person accused of the crime of arson or murder, or attempt at murder, shall have escaped indictment, or shall have been acquitted upon trial upon the ground of insanity * * * * the court shall order such person into safe custody, and to be sent to one of the State lunatic asylums, or to the State Asylum for Insane Criminals at Auburn, at the discretion of the court.' This is intended to prevent injustice in the disposition of such cases, and, practically, it does so whenever the courts see fit to exercise the discretion allowed them.

"I may state in this connection, a fact which has been observed in this State and which has struck me as being noteworthy, namely, that a large majority of the persons who have been acquitted of, or have escaped indictment for the acts mentioned, on the ground of insanity, have led immoral lives previous to their insanity, which, in many cases is the direct entailment of their immoralities.

"It is the custom here to classify patients according to the form of their insanity without much regard to the crimes they may have committed ; but my observation leads me to conclude that those who have committed acts of violence against the person are more dangerous, but, as a rule, not more inclined to escape than those who have been convicted of crimes not violent in character.

"All of the penal institutions in the State can, under the statute, send patients to this asylum.

"In respect to the production of moral degredation among the good by contact with the bad I think that the rule which applies to the same holds good, other things being equal, in the case of the insane.

"I have no statistics to show that 'the chances of mental and moral recovery are better by the separation,' but I have no doubt as to the effect upon the moral nature of an innocent, pure-minded individual who is compelled to associate with the vicious and immoral while undergoing treatment for a disease which for the time weakens all of the mental faculties.

"Convicted patients, in case of recovery, are returned to prison; but if they remain insane on the expiration of sentence they may be transferred, upon the approval of the State Commissioner in Lunacy and the Superintendent of Prisons, to the custody of the authorities of the county from whence they were sentenced to prison, or friends may remove them on furnishing evidence of ability, as well as a written agreement, to care for them; provided, (in both cases) that they are regarded as harmless and not likely to be benefited by further treatment in the asylum. If considered dangerous, or curable, they must be retained here.

"Believing I have answered your inquiries, I am,

"Very respectfully, yours,

"CARLOS F. MACDONALD."

We regret the paucity of statistics concerning the life history of insane convicts, but facts, which have plenty of coroboration, compel us to believe that not a few of those who clearly show themselves to be deranged while undergoing sentence in prison were of unsound mind at the time when they committed the act which placed them there.

In Pennsylvania the provision of a separate asylum for the class in question has been urged upon the Legislature by able committees of asylums, superintendents and others.

A commission appointed to consider the matter reported to the Legislature in 1875, advocating a separate asylum for six classes of insane persons, as follows:

1. Dangerous insane persons who have committed or shall

attempt murder, arson, rape, robbery or other high crimes or misdemeanors.

2. Those charged with committing either of the crimes before mentioned who are believed to feign insanity, or of whose sanity there may be so great a doubt as to require the investigation of experts.

3. Those acquitted of such crimes on the ground of insanity, who shall be adjudged by the court trying the offence, as persons dangerous to be at large.

4. Those charged with the commission of either of such crimes while sane, and becoming insane before trial or sentence.

5. Those becoming insane while in prison, after conviction of any crime, and continuing insane through the term of sentence, who shall not have friends or relatives to whom such insane persons may be delivered at the expiration of sentence with safety to the community.

6. Insane convicts generally, whose insanity shall have been ascertained, and who may be transferred in accordance with the laws of this commonwealth.

The persons included in the fifth and sixth classes to be received by the proposed institutions so long as there shall be no separate hospital exclusively for their accommodation, and no longer; and while in this institution their association with other inmates to be regulated according to the discretion of its superintendent.

It is clear that if these recommendations are carried into effect it would finally decide against the erection of a separate asylum for insane convicts.

Unfortunately the legislative acts and inquiries of other States cast no additional light on the subject of this inquiry.

We have now to notice the very decided opinion of the "Association of Asylum Superintendents" in favor of a separate asylum or hospital for insane convicts.

Although there seems so much unanimity of opinion respecting the resolutions formally passed at the annual meeting at Baltimore in 1873, (see *Am. Jour. of Insanity, Oct., 1873,*) yet in the discussion there is apparent not only wise limitation of the position taken on the part of some, but wide diversity of view on the part of others.

In the absence of classified facts at this discussion, it was rea-

sonable to hope that there would be forthcoming exact tables which would show the prison record of each convict, relating to the character of his or her insanity in all its details, so far as they could be ascertained, including suspicions of heredity phases, violence on the one hand and imbecility on the other, etc. It is not too much to say that strong assertions have not been supported by clinical observation widely extended, so as to render induction safe, except as they have been embodied in general statements.

One Superintendent forms his judgment in a crowded asylum, to which are sent from prisons only the dangerous insane. Another says I would, if it were in my power, apply this rule (of separation) not only to epileptics, but also to dipsomaniacs, and hence I have never appreciated the importance of separating criminal lunatics in ordinary institutions for the insane. While he (Dr. Nichols) thinks they should not be promiscuously placed in wards, he has also the same opinion regarding some other classes.

Dr. A. M. Shew, of the Hospital for the Insane, Middletown, speaks thus:

"Three years ago the Legislature of Connecticut passed a law requiring the trustees of the hospital at Middletown to receive all insane convicts, after a proper examination, which was specified, and a commission appointed. We had no separate provision and were obliged to receive them in the hospital proper, and place them in association with the other patients. Since that time twelve insane convicts have been transferred from Wethersfield to Middletown; two of that number have escaped; one of them feigned insanity; arrangements had been made to transfer him to Wethersfield, but he escaped the very night before the transfer was to be made. Of the ten others, seven have been among the most valuable farm laborers, harmless, industrious and peaceable, and yet positively insane, much less dangerous than many of the chronic patients we have."

We have carefully collated the reasons given in the various discussions within reach and find them to be as follows:

(*a*). That the character of insane convicts requires greater safeguards both as to the buildings and in the administration.

To this it may be replied that it can hardly be asserted that

the convict insane require such safeguards or such special constructions as cannot be secured in parts of buildings already erected. There are few who would claim that the convict insane need closer surveillance than do the homicidal insane who have attempted criminal acts.

One of the most prominent advocates for separate asylums (Godding, Superintendent of Taunton Lunatic Asylum, 1871, p. 130,) would make also "distinct provision for the homicidal insane, including with them the incendiaries, a small but very dangerous class."

A lady of fine culture subject to emotional and periodic insanity, who spent considerable time in two different asylums, often as a sane observer, insists that the dangerous and demoralizing class in most insane hospitals is the dipsomaniac class.

They have often lost all self-restraint, are vicious and ungovernable, and disturb both the order and morale of many an institution.

A gentleman now in private practice, but for many years connected with asylums, and consulted as an alienist, tells us that this view is undoubtedly correct.

(*b*). That insane convicts, as a class, require closer discipline than the general average of asylum patients may be true, but it is, we believe, not shown that because of any special peculiarity in the type of their insanity, do they need special hospitals more than do those disposed to homicidal acts, or more than do incendiaries or other classes that might easily be named.

Indeed, in one of our own State asylums, "of the forty-six cases transferred from the State prison to the asylum, thirty-four still remain with us. Most of those brought us are either demented or the tendency is to dementia, and hence, incurable."

Our asylums at present are built not merely as hospitals, having reference to the peaceable insane, but also with reference to the fact that there will be many inmates of a dangerous or extra-hazardous character. Unless it can be shown that the convict insane far surpass all other classes in the element of danger, the argument which presents them as requiring an asylum, and constructive safeguards with expert administration surpassing all others, is not well supported.

(*c*). An argument which is very prevalent and influential is that it is the right of the innocent insane not to be associated with

the "convict insane." "The State has no moral right to compel its honest citizens, sane or insane, to associate with criminals." The author of this proposition declines to offer any support other than "the simple statement of the fact is enough."

That this has not been conclusive to all minds is shown both by direct expression of opinion and by the habit of all countries and States thus far, which do place with the convict insane, those who in the innocence of insanity have committed homicidal acts. While we have great respect for sentiment and the moral conviction of men after due examination had, yet we cannot so hastily conclude on this simple statement that it may not be right or expedient to treat in the same hospital the insane convict with other insane persons—the classification being on a different basis.

The social science student suggests "that the two classes are often not separated on any principle of moral responsibility, as the insane convict is frequently one who was suffering, at the time of his act, under a disability that the courts failed to detect at the trial for want of proper defence, or because the mental disease was still latent." Also that "insanity suspends punishment, based upon previous conduct, and there is, therefore, no reason for any separation based upon moral ground, or any separation except such as is founded upon the natural aversion of the inmates and their friends to such association."

The writer reminds us that it is not fair to represent every convict as a murderer, an outcast, an inevitable wretch. Not all even of the inmates of State prisons are such. Some are undergoing sentence for what the law calls minor offences. If all higher class (or paying) patients were excluded from our asylums, we should find closer bonds of relationship between insanity, pauperism and crime than the superficial observer would otherwise detect. Society does receive back to itself the convict whose sentence has expired and endeavors, often successfully, to prevent such persons from any repetition of criminal acts. It is not moral obliquity to claim that, in relation to the inmates of an asylum, the convict has had expiration of sentence when insanity has vacated penal punishment, and that the asylum is not degraded or endangered by his presence any more than society is by receiving him back to itself.

If the question of insanity were set aside there are many in

asylum wards who would be demoralized by the grade of the inmates. If it is correct to say, as Dr. Gray did, that "a large number of those acquitted on the ground of insanity are essentially of the criminal class," the same might be said of certain other persons found in our asylums.

Our asylums are intended first of all for the pauper or dependent classes whose relation to lost self respect, to inherited evil, to indulged vice and crime has often been such as to forbid our making such incisive distinction between some insane *paupers*, and some insane *convicts*.

When insanity has invaded both and the law of charity has suspended that of retribution we cannot say to every convict, "Still the mark of your crime must be upon you even though insanity has suspended punishment."

The following letter, from a former Asylum Superintendent, an eminent physician of our own State, expresses a view fast gaining ground:

"BURLINGTON, August 23, 1878.

"*To the Secretary of the State Board of Health, of N. J.:*

"MY DEAR DOCTOR:—My own conviction is, that there are no sound reasons for separate institutions for those who are called 'criminal insane.' The term itself is an unfortunate one, if indeed, it is not a misnomer. Insanity precludes the idea of voluntary crime, and occuring in a person who has been previously convicted of crime, and imprisoned, removes the criminal view of his case, and places him on the list of insane persons. Every well defined disease has its recognized pathological character, and the moral state of the sufferer does not alter the pathology of the case. So, every form of insanity, has its own characteristic lesion of structure, or functional disturbance, and I see no more reason why the glandular ulceration which characterises typhoid fever, should be different in a criminal from what it is in a saint, than I do why the cerebral lesion which gives rise to mania or paresis, should be modified by the moral character of the individual. If the pathology therefore does not differ in the criminal, why should the therapeutics? There are convicts in prison who may become insane, and there are insane

persons in asylums who may commit crimes that would consign them to the penitentiary, but for the fact of their insanity; and there is no evidence of any difference in the psychical state, or in the pathological condition of such, to warrant their separation from other insane patients, that is not already provided for in the massive and elaborate appointments of our lunatic asylums.

"The number of convicts who have become insane, and of insane, who commit crime, is so small that it would seem unwise to spend more than the millions that have already been expended on lunatic asylums, for the separate custody of the class referred to. It would seem to be especially unwise in view of the fact that a considerable proportion of the insane in our asylums are harmless, and could enjoy more freedom, be made more comfortable, and have a better chance of recovery, in less expensive and more home-like establishments.

"Admitting the necessity of removing criminals who become insane from prisons, is it not safe to conclude that the cellular plan of our asylums, together with their admirable hygienic arrangements, and the provision for constant and intelligent medical care which they furnish, can be made to meet such necessity by the establishment of criminal wards, and a further classification of inmates, so as to include the so-called 'criminal insane?' I am aware that it is common for alienists to advocate the construction of separate institutions for the class under consideration, and that by such advocacy there is engendered a sentimentalism which takes the form of horror at the thought of contaminating the 'innocent victims of insanity' by the presence of 'dangerous criminals' from the penitentiary. With this unphilosophical view, there is, however, but little sympathy among those who recognize the great truth, that, insanity in criminals and saints alike, is a terrible scourge, which neither respects nor even recognizes rank, or wealth, or culture, but levels all alike to a common scale of broken and dependent humanity; and that, whether the accident of crime, or disease, or misfortune, or sorrow, be the exciting cause, it comes to all its victims with the same dreadful blight, and should be met by an equally wise and generous care.

"I am, my dear sir, yours most truly,

JOSEPH PARRISH."

Thus much it is proper to say, although we fully realize the unfitness of certain insane convicts to mingle with the average inmates of the asylum.

Regarding types of insanity, and the influence which might be exerted over certain classes of patients, and even regarding the sentiment of insane persons not wholly bereft of reason, we would favor special provisions in the care of those whose acts had been specially notorious; but so would we also in other individual cases equally dangerous, equally demoralizing, equally shocking to the prevailing sentiment of the better class of the insane and their friends.

We believe that the tendency of sound opinion based upon experience and reasoning is toward many separations and classifications of the insane in our asylums, which will in time, supercede much of our present ward systems, vacate many of our palatial structures, distinguish between the hospital and the asylum, provide farms and industries and treatments far different from those which at present prevail, thus opening questions of grand import, vital in the future and of interest to all who care for these unfortunates, whom as well as the poor, we have always with us. What we now claim is that the insane convict, like any other insane person, is to be dealt with as an individual, and not as belonging to a class. If he be an idiot, we see no reason for a special hospital for him. If like the homicidal madman or the illusionist, or the incendiary, he requires special guard, that he should have. If his crime has been of a nature so abhorrent as to be singled out, he may be placed with those unconvicted inmates, whose presence in the general wards may, for any reasons, be equally degrading or demoralizing.

What we feel to be the need of our State is that, one of its asylums should have such special provisions as to permit the consignment to it, of all cases, which in the judgment of proper authority, should be separated from the general average of asylum patients. We can see no objection to the use of an extreme wing of our largest asylum; or if there is no room in it, to an annex a few hundred feet therefrom, connected by a corridor, and specially fitted for the reception of all classes of extra hazardous insane. To this should not be attached the odium of a convict hospital. In it, however, might be placed

the homicidal insane, those inclined to arson, and others recognized in all asylums as dangerous and difficult of classification.

We confidently believe that if there is no inflexible routine policy in the management of our State institutions, the force of sentiment, conviction and economy will lead us to thus provide for our more degraded classes, whether pauper or penal, and at the same time secure to some supported at private expense, facilities of separation more valuable than can be secured by merely singling out a class, having no just reference to the type of their insanity or the degree of their insubordination.

CYRUS F. BRACKETT,
EZRA M. HUNT,
Committee of State Board of Health.

This report has been submitted to the Board and ordered sent to your Excellency, with its approval.

Report of an Outbreak of Enteric Fever

AT THE STATE REFORM SCHOOL, JAMESBURG, N. J.

BY EZRA M. HUNT, M. D.

Under date of August 15th, 1878, I received a letter from Samuel Allinson, Trustee of the State Reform School, stating the existence of sickness at that Institution, and asking the counsel of the State Board of Health. He says: "Within the last two weeks not less than twenty boys have been in bed with fever, and with typhoid symptoms. There have also been a number of cases of dysentery and a few of diphtheria." "The premises, kept scrupulously clean and neat, have been examined, but no adequate cause for such distempers has yet been developed. The water, food, sewage and labor have all been rigorously questioned, without satisfactory response. I have been at the School several times within a week, as have other of the Trustees, but I fear the disease may not yet have run its course. There must be some local cause, as the neighborhood is not affected, as it would be were the cause atmospheric." The next morning I visited the Institution for the purpose of ascertaining the character and cause of the outbreak.

We listened to the history of the endemic from A. J. Knappen, M. D., the Physician of the Institution. He resides at Jamesburg, three miles distant, and is the only physician of this immediate section. Occasional cases of fever, which he regarded as typhoid, had occurred in his practice, but none recently. He had not been able to connect the outbreak with any neighboring conditions. No local causes had been discovered. He regarded the fever as of a typhoid or typho-malarial tpye, and thought it endemic in its character. Up to early spring the health of the Institution had been uniformly good, but in March, and since, there had been many cases of sore throat of a diphtheric type. Malarial fevers were not uncommon in adjoining neighborhoods, but there had been no unusual prevalence this summer.

Some of the pupils had complained more of headache and of stomach and bowel disturbance than usual. The doctor and others recognized the fact that for several months the health of the Institutiou had not been up to its high general average. The number of boys at present in the Institution is two hundred and eighty—the usual number for the last two or three years having been two hundred and fifty. The attendants increase the whole number of persons to over three hundred. The boys are divided into four families, occupying (except when together for eating, work, &c.,) four different buildings, known as No. 1, 2, 3 and 4.

OUTLINE OF THE PRESENT EPIDEMIC.

Early in July a case of sickness occured of marked febrile character. The boy had been necessarily kept for ten or twelve days before in a small room in the attic of the main building, known as No. 4. He belonged to the family of boys of building No. 3, situated as shown on the ground plan, and died in that building the third day after he had first been seen by the physician. He was always stolid and reticent when troublesome, and no doubt concealed his sickness at first. Before his transfer he had used at night the water-closet of No. 3, and afterward was allowed to go to the outside privy used in common by the families of No. 3 and 4. In going from his room he passed the well, known as the chain pump, and obtained water from it. When the attention of the Superintendent was first called to him, he at once recognized his condition as serious. The doctor found him with rapid pulse, high temperature, some diarrhœa and an eruption. His sickness, while under his observation, was so short as scarcely to admit of positive diagnosis.

The second case occurred the seeond week of July, or about one week after the death of the first, and the same week there were five or six new cases, most of them from the families of Nos. 3 and 4. Since then new cases had continued occurring to the number in all of thirty-five. For them a new upper room in No. 2 was being used as a hospital in place of the former small hospital in No. 4. At the time of my visit, August 16th, I found twenty-six in bed in the hospital proper, and five more in the convalescent room outside. A few others were listless, and

evidently avoiding the hospital. It is not necessary to give in full my clinical notes as the only point here in place is identification of the disease. The temperature had been noted once each day, and the fever might rank as remittent or continued. We examined several with reference to the rose colored rash. Some had a fading rash, but none distinct at this visit. Two or three had sudamina; none had had intestinal hemorrhage, and only a few diarrhœa. On my visit August 20th several more had been added to the list. Many were mildly sick, and a few with sordes, delirium, and other critical symptoms. We found a distinct rash in one of the more recent cases. From this time on for about two weeks new cases were constantly occurring, but the disease did not assume a more critical character, and quinine was being freely used as an antipyretic, and seemed to answer its purpose well, except in two or three cases.

Another of the boys died August 24th. That there might be fullness of evidence as to the diagnosis, I secured Dr. E. G. Janeway, Professor of Pathology, in Bellevue College, New York city, to conduct with Dr. J. P. Knappen and myself, a post-mortem examination.

The following is an abbreviated outline of appearances: Right lung nearly normal; left lung had lobular pneumonia of the upper lobe without any discharge, but at one point abscess was forming; other parts of the left lung were congested; the heart was of usual size, walls not thinned, valves complete; the liver was somewhat enlarged but healthy; the spleen was not softened and nearly of usual size; stomach healthy; mesenteric glands—numbers of them enlarged and varying in size and hardness—some of them softened; duodenum and jejunum nearly normal; ileum congested, at points enlarged and ulcerated; commenced its examination at cæcum; an ulceration on the iliac surface of the ileo-cæcal valve; ulcerations in the lowest of Peyers' plates; the patches raised and enlarged; more than a dozen distinct ulcerations extending along three feet of the ileum; one of these had reached the peritoneal coat; solitary follicles raised and infiltrated and prominent at many points; colon healthy, except congested just below the ileo-cæcal valve; kidneys normal, except slight granular change of the epithelium.

The examination, together with further observation of the

sick in the hospital, left no doubt in our minds that the prevalent disease was enteric fever, and even seemed to dismiss the question whether it might not be typho-malarial or a type of some more general form of septic fever.

EXAMINATION INTO THE CAUSES OF THE OUTBREAK.

On our first visit, careful study was made of outlines preparatory to a fuller investigation.

There was no prevalent epidemic in the vicinage and sporadic cases of fever long before did not seem to give any connecting clew.

The milk and food supply was questioned in detail but nothing found suspicious in this direction.

The location would not account for the sickness unless malarial.

The ground is a table land with fair declivity in three directions and a greater slope to the east. The opportunities for drainage and for carrying off sewerage are excellent.

The surface is a gravelly loam and loose gravel not stratified for a depth of ten to twelve feet, when a uniform layer of clay is reached, impervious and so causing all soakage to seek outlet in any excavations deeper than this and rain water to find its way out along at the edges, and especially to the east, to which the slope most inclines.

The absence of any effect to others from lowlands in the distance, precluded a purely malarial origin to a fever, which at this time might have been assumed to be of a mixed character.

The housekeeping of the institution, and its management in all its appointments, on a close inspection of rooms, beds, laundry, kitchens, etc., seemed so good as to be a model for any such institution. Indeed to this, we must attribute in some degree the milder character of most of the cases.

By the method of exclusion attention come to be necessarily fastened upon the water supply and the sewer system indoors or out as in some wise bearing upon the sickness. The buildings located as shown upon the ground plan were then examined with reference to these.

Building No. 1 had its own water supply from a well beneath. Although this was of questionable utility, yet it was not a surface well and not apparently exposed to any impregnating causes.

The fall is good for all house wastage, most of which is emptied outside. The whole situation of the building seemed to us in a sanitary view, the best of any. It had no water closets or laundry. The outhouse is on a side hill, with rapid fall and is easily kept in order.

Building No. 2, several hundred feet to the east, has no inside water closets, and good out-door arrangements. Its storm water like that of No. 1, passes outside. Like it, it is heated by its own hot-air furnace. The bath and the water basins empty by a pipe into the drain of No. 5, but it is well trapped. The drinking water is derived from a well under the building and seems rather more exposed to surface contamination from the bath room and the proximity of other buildings than that of No. 1.

Building No. 5 is next to No. 2, about one hundred feet to the south. The lower part is occupied by the engine room and laundry; most of the first and second floors by a work shop for shirt making by boys from the various buildings. The entire laundry work for all is done in this building.

The dormitory on the third floor was occupied by thirty-four boys. On the same floor in a new extension are the rooms recently occupied for a hospital. It is heated by steam from its own boiler. Formerly the exhaust pipe entered into the inner sewer, but as steam and bad odors were found to come from an upper water closet, the exhaust was changed to the outside. There is but one water closet in the building and this near the hospital, which was very little used and not well trapped. Its soil pipes joins the sewer which carries the laundry and waste water under the building and is carried out to join the main sewer from No. 4.

Its water supply is from the same reservoirs which supply No. 3 and No. 4, hereafter to be noticed. Its supply pipe comes off from the suction engine, which draws the water from the reservoirs and sends it to No. 4, from which No. 3 is also supplied. Thus it will be noticed that these three buildings have a common water supply distinct from No. 1 and No. 2. This building also has at a distant sewer entrance, connection with the sewerage of No. 4. But as there is little soil matter in this building and as the laundry water is carried through a fall to meet the main sewer outside, it is not closely connected therewith. Besides as only one floor is occupied by thirty-four boys as a dormitory, the

building is used more for bakery and workshop purposes than for housing inmates. The soil here for the excavation of the new parts of the building is very gravelly.

While close examination has been made of all these buildings and some few matters seem to need correction in construction arrangements, the history of the first cases of outbreak and defects seen in the first examinations of the other two buildings must lead us to be even more suspicious as to them.

Building No. 4, as shown upon the ground floor, occupies a central position among the other buildings. It accommodates the family of the Superintendent, and is the dining place of all the boys and furnishes dormitories for about seventy-five.

The basement floor is about four feet below the surface, and is occupied for kitchen, dining-room and administrative purposes. The first floor has auditoriums, school-rooms and rooms for the administrative officers, while dormitories and other rooms needed occupy the second and third stories.

This is the only one of the buildings which can be said to have been fitted up with all the modern improvements.

INSIDE WATER CARRIAGE.

The water supply from reservoirs at a distance, hereafter to be more fully noticed, enters the house from a main in the basement, and is lifted by a steam-pump into a large cistern in the attic for distribution. There is also a hot water tank in the attic, the water of which is heated in the basement, carried by a pipe up to the tank in order to be distributed for washing, bathing or other purposes. This was introduced in May or June of the present year. The up-going pipe, which carries the hot water, passes in its length close to the soil pipes for the whole building.

SOIL PIPE.

This commences in the attic, as the overflow pipe from the cold water cistern, so that it may be flushed by water therefrom, as frequently as desired. It has in the attic a deep U bend, or water-seal trap, to prevent the outflow of gases, but has no ventilation out upon the roof just adjacent. Although the depth of

this bend at first seemed quite sufficient to make an effective trap, the mode of its placement showed that only from one-half to one inch of water-trap could be secured in it. When the new hot water tank was set up in May a small tube for steam escape was passed from it to enter the soil pipe about an inch beyond the trap. This was a constant dryer of the water in the trap, and had so affected a joint just beyond as to cause water to drip therefrom. Thus the trap was really ineffective. A tin leader letting water from the roof into the soil pipe on the lower story, would serve some purpose to ventilate the soil pipe, but as the long sewer outside had no opening, this would be imperfect. The refuse water from the bath tubs, wash basins and water closets on each floor is carried by waste pipes directly into this soil pipe adjacent, which runs from the top to the basement. As it is necessary to carry hot water into the attic tank, and as it runs up in a pipe near the soil pipe and is crossed by the hot water offsets from the tank supply under each wash bowl and close to each water closet, heat and moisture are constantly maintained. We found the closet by the wash bowl a heated chamber, and in July could not bear the hand upon the small pipe close to the water closet and the main soil pipe.

WATER CLOSETS.

These are on the second and third floors. On the second floor was one for the part until recently used as the old hospital. It had a separate soil pipe carried to the basement. The chamber slops are emptied into these water closets, each on their respective floors.

The baths connect with the water closets, and in some, one trap served for both these and the wash stands. The third floor water closet had but one trap. These water closets empty directly into the soil pipe, which collects the sewage of the building.

The gentleman who has oversight of the heating engine states that he has occasionally found the traps empty, and that he had noticed, as have others, bad odors through the rooms, and especially at the traps.

As the soil pipe in the second story receives the storm water from a roof this might at times syphon the traps.

The soil pipe which carries the general soil and sewage of the

building has no ventilation save such as it gets from the bath tubs, basins, water closets and the storm gutter on the second floor, which at times may act either to syphon smaller tubes or force out stagnant gases.

OUTSIDE CONNECTION OF SEWERS.

The soil pipe come to a main terra cotta drain just outside the building in the rear of the basement, near by it is joined by the hospital pipe before noticed, then there enters a pipe from a kitchen sink but a few feet distant which receives the slops from dish and dining room work for the whole school. These all not far from each other join to empty all the soil pipe and waste sewage from the entire building and much storm water into this terra cotta pipe. About the last of March it was found by the action of the kitchen sink that there was back flow. On taking up the floor an overflow 6 inches deep was baled out from under a room 20 by 20. This overflow was owing to the fact that in the terra cotta sewer at the point where the kitchen annex joined it a brick had fallen or been left at the time of connecting it a few months before. This kitchen sink has no grease trap and no trap of any kind now, although it is said that one was ordered at the time of its construction. It is but a few feet distant from one of the dining rooms, with an open place between them.

These various pipes thus uniting into an 8 inch terra cotta pipe run some 70 feet to a tightly covered brick enclosure of half barrel size into which enters a small pipe from an outside sink for kitchen slops, and also a small pipe from a basement faucet for hand wash. The continuous pipe for carrying on the sewage from this new centre is narrowed to 6 inches. As we opened this small cess pool the current was very slow and fœcal matter was found floating down from the faucet pipe. A test by putting permanganate of potash as a coloring matter in at the faucet showed that sewage, both liquid and solid, coming down one house pipe found its way up another.

The sewer now continues several hundred yards without ventilation from attic to its terminus, except what it might secure from incidental house defects, and empties a water which the analytical chemist finds likely to have passed through pipes

in the ground which are not sufficiently impervious. The 6 inch pipes also receive at a distance below the brick enclosure the sewer from building No. 5 before noticed.

METHOD OF HEATING.

Before last winter the building had depended upon *furnaces* for heat. In December a high pressure steam system of heating was introduced. The discomforts of the low temperature of former years gave place to excessive temperature which was much complained of.

Some claimed that soon after diphtheria made its appearance, and that the health of the Institution had been decreased. If so, it must be attributed to the fact that increased heat added to the risks from organic contaminations. The introduction of heated water-pipes in May for the hot-water tank in the attic, so near to the soil-pipe, would aid decomposition.

The only remaining building is No. 3, as shown upon the ground plan.

On our way to it, it is well to notice the building marked as the "Old House," which had been on the place for a century. It was in a cleanly condition; its cellar dry; had in it a small school room, and play room used by No. 4 family, but no dormitories. It had formerly been to some extent used as a laundry. Its stone wall needed watchfulness lest some incrustations upon it or decay of stone might furnish organic debris, or be the attaching place of unhealthy fungi. It had no water-closets, but an untrapped urinal and a washing trough connecting with the main sewer of No. 3, were not desirable.

The building No. 3, to which we now come, and where the first patient died, after a sojourn in No. 4, is located to the southwest of the main building, as shown on the plan. It accommodates fifty-seven boys, who sleep in the dormitories on the second and third floors. The heating is by stoves.

It is the newest of the buildings, having been erected in 1875.

The ground over which it stands was a little marshy, and had at times some water on it. The surroundings now seem compact and dry, although no special method of outside drainage was adopted. There is a basement, playroom and boys washing place, and under this the excavation is about two feet

deep in all below ground. On this floor, back of the stairs (the entry, is a water-closet much used. Each dormitory has water-closet in a recess of just room enough for it, and openin into the middle of the dormitory. These are used at night b the boys, and were in use by the boy who first sickened, as we as by the others, before his temporary transfer to No. 4 two week before his death. The closets have a hopper trap which depend for flushing on water which pours into it during use. These gav much trouble, because they would not infrequently stop up, an had even overflowed. For this reason, quite recently all bu the basement one had ceased to be used. There were two place in the basement where a small opening in the floor could b raised for inspection. The soil-pipe is the s me for the thre and was found to enter the house sewer at a point in th sub-cellar under the entry-way. This house sewer, besides th soil sewage, carries also the water from the boys' basement was room, and the storm water from the roof. The arrangement i thus: The storm water at the northwest corner (A) enters a terr cotta cemented pipe, passes along it, nearly parallel to th foundation, to the point (B), where, by a curve joint, it passes o to (C) and receives the soil-pipe, and then passes on and ou forming the sewer E, as shown on the ground plan. But at th point E, where the terra-cotta curves, it has an opening mad by a Y tile. The fall from this point to where the soil-pip enters, is one and three-quarter inches in thirty-seven and on half feet. Beyond the entrance of the soil-pipe the fall does n increase. At our first visit we found this open Y mouth unde the building with a little pool of water about it which smelle badly, and we therefore took a sample for examination. Th man in charge said he had to bale out sometimes as much three barrels; that he did not know for what purpose the Y i the sewer had been made; he supposed it was closed, and th the water which he had taken out was merely water whic smelled because it had become stagnant. The chemical exan ination showed a water deriving pollution from various source and the presence of nitrous acid showed that an active decomp sition of nitrogenous matter was taking place. On my retu soon after, the little water had subsided. I had a boy get dow to see the condition of this Y joint. It was found open an stenchy. Thus, rain water from the roof, and wash water from th

boys' basins must, with the slight fall, have leakage here. Worse than all, with the defective fall of the sewer, a stoppage of two inches at the entrance of the soil-pipe would send the liquid water-closet matter out at this opening, besides the constant escape of fœcal gases. I felt confident that such stoppage had often taken place, and the next day, on excavating at the point of junction, the sewer was found choked at where the soil-pipe entered. All use of closets was discontinued, and such temporary change made and such disinfectants used as would at least help to suspend so flagrant and exciting cause of disease. On visiting the privy in the rear of this building, used in common by houses No. 3 and 4, discharges were seen of a dysenteric character; some boys were looked up who were about No. 3, and found so unwell as at once to be advised to hospital. We cannot conceive what the original intent of the opening in the sewer alluded to was, except that it had been left as an exit for any surface water which might collect under the building, the fall being deemed enough to carry off the stream without regurgitation. As it was, it not only was an escape hole for sewer gas, but for fœcal and sewer accumulations, and furnished soakage material for all the adjacent soil. It could go down only five feet deeper on account of the impervious clay, and so must spread laterally all the sooner.

WATER SUPPLY.

Our attention must now turn to the water supply. Already we have found that No. 1 and No. 2 buildings are supplied by wells of their own. These are under the buildings and seemed to the senses to be in good condition.

No. 5, No. 4 and No. 3 by way of No. 4, derive all their faucet water supply from two tanks situated in the ground several hundred yards from the buildings. The water from these is mostly intended for other than drinking purposes, but being easily accessible, is often used by the boys. The water in these tanks seems clean, although in one of them having a doubtful odor. Both of these tanks are to be regarded as shallow surface wells, safe perhaps under the most careful watching, or so long as a surrounding soil, free from organic matter or domiciliary sources of decay, and of good percolating capacity, was able to filter it.

Our chemical examinations were made with great care by Prof. P. Townsend Austen, Ph. D., of Rutgers College, New Brunswick, but it did not extend to quantitative analysis. Several specimens were sent at three different times, and in some cases as with the tank, duplicate specimens. Both tanks were each time reported as surface wells without organic matter. The amount of chlorine and nitric acid found were spoken of as danger signals, but it would require a quantitative estimation to positively state them as dangerous.

The water is conveyed from one or the other of these tanks as may be desired, (one only having lately been in use,) through a common main made of close jointed iron pipe of an average depth of four to five feet, the water being drawn by the exhaust or suction of a steam engine, and being distributed by an offset pipe to No. 5, by a main to No. 4, and through it to No. 3.

Prof. Austen also made examinations twice of water from the kitchen faucet of No. 4. which came from the tank water.

The report on this was not so favorable as upon the source from which it came.

" The large amount of chlorine and absence of lime point to infiltration of sewage. View strengthened by presence of considerable nitrates. Presence of nitrates show water to be decidedly dangerous. May be a surface well or rain water impregnated with sewage."

The difference might be accounted for by some defect in the iron pipe, or its joints, or by reason of thinness. The sewer pipes also necessarily come near this iron water main here and there in its course.

Also as the supply is through the cistern in the attic where the water might absorb foul gases, or where the soil pipe, which serves as the overflow pipe, ends, and might have its water-trap imperfect, it is quite possible that somehow the water might be contaminated in coming from its storage.

The water from these outside tanks or reservoirs was not used as drinking water much in either No. 4 or No. 3, and probably not at all by the first boy that died.

The main supply of drinking water for all the boys of No. 4 and No. 3 was derived from a well known as the Chain Pump Well. It is situated, as shown upon the ground plan (marked

F) in the vicinity of buildings and about one hundred and fifteen feet from the corner of building No. 3.

This water was preferred and exclusively used by all the officers and their families in the adjacent buildings, and by the boys of No. 3 almost exclusively, and much by those of No. 4, as most of these had occasion to pass it. The well itself is well covered and an enclosed chain pump raises the water.

Its depth is seventeen feet or *about eleven feet below the level of the sub-cellar of No. 3 with the natural drainage, aided by the old house cellar in that direction.* Here the clay bed is about twelve feet from the surface, so that cesspool drainage from the sub-cellar of No. 3 where the open soil pipe was found, would have a fall of six feet to bring it to the surface of the water which was about thirteen feet from the top of the well at our first visit.

The following is the report of Professor Austen thereupon, the water having been procured August 20th, 1878:

"(118.) Water turbid; chlorine large; nitrites, absent; nitrates, large; lime, large; sulphuric acid trace; carbonic acid present; organic matter, large; ammonia absent; (?) regular well water; lime present as bicarbonate; results of past infiltration probable. The amount of organic matter is large and renders the water totally unfit for drinking purposes. It would be interesting to examine the well about a month later." About the same time A. E. McLain, a chemist of New York city, examined this and other wells. His note reads thus: "Chain pump is similar to that marked family well No. 1, but contains more organic matter. *All of them* contain ammonia, nitrates, organic matter apparently of animal origin and an abnormal quantity of chloride of sodium."

We now restate the problem to be solved with some of the most important conditions bearing upon it plainly before us.

The outbreak is plainly that of enteric fever. All efforts to trace it to an outside source have failed and made it quite positively probable that the causes were to be sought within the confines of the institution. The history of those first attacked, an examination of sewerage systems and water supply, and a comparison of the buildings with each other in the marked difference in their arrangements as to heating, sewerage, inside conservancy, water supply and modes of distribution, associated No. 3 and 4 and 5 together. No. 5 as being less used as a dormitory,

as having but one water closet, not now in use, as having its outside closet arrangements with No. 2, and not so in proximity with the common drinking supply of No. 3 and 4, seemed after careful allowance was made for some defects, not to be prominently bebefore us as the fount and origin of the malady.

With the facts as to No. 4 and No. 3 as already stated, we have this hypothesis before us:

A boy of the Family of No. 3 is taken sick. He had used an inside privy now known to have been clogged and been in a building in which excremental and other matters were escaping through an open tile as fully described. Foul air from this source and from the stagnant water thereof could not but permeate this building. We are first in such cases, says Buchanan, to look for conditions under which air contaminated by excremental products could be conveyed. The conditions found in No. 3 would of themselves be fully adequate to the furnishing of excremental or other enteric matter through the air of the playroom, the washroom or the water closets. But besides this the well of water within one hundred and fifteen feet of the corner in which the liquid discharge had made a cesspool, and where the soil was saturated with sewer contents, is found to contain organic matter probably of animal origin.

While for a time at this distance it was possible for the intervening soil to cleanse the soakage, yet with this oft recurring fœcal and waste cesspool beneath No. 3, at the corner toward the well and several feet below the ground level, and with an impervious clay subsoil, it was quite possible for the water to be contaminated as well as the air of the building.

The boys who fell sick within a week after the death of the first boy, were mostly those of Nos. 3 and 4. These were using the outside privy, to which the first boy went daily, and into which his discharges were thrown until the time of his death. A source of infection was easily multiplied in this way.

There were sufficient ill conditions as to sewerage arrangements in building No. 4 to account for the presence of sewer air in that building, but no one condition was so flagrant as that of No 3, and none so likely to furnish the specific poison of enteric fever as either the air of No. 3, the excretions of the outside privy of No. 3, or the well water of the chain pump.

The boy who was temporarily detained for several days in the

small attic room of No. 4, we believe had contracted his fever before his transfer there. His closer confinement within doors, the air of the attic and his more restricted diet would incline the the disease to intensify.

When first seen by the medical attendant he was probably in the second week of the disease, and died in ten or twelve days. He had, however, been returned to his room in No. 3, so soon as he was found sick enough to need constant care.

The only confusion in assigning the origin of the outbreak arises from the fact that in No. 3 and in No. 4 so much in construction could be found objectionable.

Yet we believe we are to look to No. 3 with its cesspool beneath the building, fouling the air, with a well contaminated therefrom, and with a boy whose discharges were a constant exposure to the boys of Nos. 3 and 4, for the earlier cases.

It is of comparatively little importance whether the contaminated air, the contaminated water or the changing discharges spread the disease since, for the well we can find no possible cause for pollution, save that which was to be found under building No. 3.

In all other respects save that of exposure to sewer contamination, the care for the pupils was so good and the ability to nurse them so available, and the medical treatment so characterized by singleness of purpose and expectant treatment, that we are to attribute to these, as well as to the mild type of over half the cases, the low rate of mortality.

From August 16th, when there were twenty-six in hospital, up to about September 4th, new cases were occurring every day, until over seventy were down. Some changes were made at each visit, but it was not until the condition of sewers had been fully discovered and the water supplies had been tested, that efficient correction, for the time being, was thoroughly instituted. This was completed about the 23d of the month.

Two weeks from that time, or about September 4th, there was a sudden cessation of new cases, in a most satisfactory manner. The infective cause had ceased to operate, and only those before impregnated suffered.

On our visit October 26th we found three convalescents from the fever still in hospital, all of them having been there over six weeks.

We have occasion for great gratitude that an infection so clear in its character, so potent for evil, so extended in its influence should have been limited even though it cost so much of care and anxiety and so much addition to the usual expense of administration.

But it will not be a useless lesson if only it shall lead to a careful study of the whole subject of manufactured disease and a proper recognition on the part of our authorities of the great importance of skilled construction.

No institution in the State, so far as we know, can boast of better discipline, housekeeping or management. Yet it had errors as to its "conveniences" so terrible that we may almost welcome the trial which has exposed to us the fearful possibilities of greater mortality which impended.

Not only other public institutions, but country and city houses and whole sections of some of our closely populated districts have errors of a similar kind which are constantly causing mild forms of sickness and which by an unfortuitous combination of circumstances may easily give rise to a pestilence which will walk in darkness and to a destruction which will waste at noon day. Our ability to detect, prevent or remedy the causes of disease is now such that very many things once hypothetical are raised from the sphere of the probable or experimental to that of the known and actual. Reliance cannot be placed alone upon the plans of architects and the skill of mechanics, or the general opinion of a physician. There must also be the addition of expert sanitary inspection. The mason cannot be the carpenter and the carpenter cannot be the plumber, although each may have some general knowledge in the department of his co-worker. So the sanitary requirements in all structural appointments is a department by itself and must form a part of the superintendance in construction.

This establishment furnishes an illustration of how much faulty, unsanitary work can be done by mechanics of ordinary repute, and how an institution admirably organized and kept with most sedulous care and presenting the most tidy attractions, can yet have in underground sewers and cesspools, in house traps and closets, in imperfect drainage or water supply, enemies in ambush, casting firebrands, arrows and death.

We desire to testify to the promptness with which the superintendent, trustees and officers of the institution applied remedies for discovered defects and hastened the use of measures to limit the endemic. Yet there are structural changes to be made by which in the future it will be impossible for air or water to become impregnated with sewer air or infective particles.

The State Board of Health gave us at once full authority to make all needed investigation. E. A. Osborne, C. E. of the Board, also visited the school and others who were away from home for August endorsed and urged by letters the most careful examination. We were thus able to co-operate with the trustees, superintendent, physician and other officers in a common interest for a common defence. We doubt not that such corrections and additions of structure will now be executed as will maintain the earlier record of the school for its almost exceptional degree of health and thus continue to render the institution one of the most important and successful charities of our State.

5

HATTING.

AS AFFECTING THE HEALTH OF OPERATIVES.

BY L. DENNIS, M. D.

At the request of the State Board of Health, of New Jersey, I have, for some months past, been investigating the sanitary relations of the business of hatting.

Inquiry reveals the fact that in the U. S. Medical Library, at Washington, there is no entire volume in English on this subject. Neither in the Astor Library, in New York, nor in the Mercantile Library, in the same city, could anything be found on the healthfulness of trades in general. Which facts would seem to indicate the need of an awakening of our individual physicians as well as boards of health to a more thorough examination of all the hygienic conditions of factory life.

A paper by Dr. J. Addison Freeman, of Orange, on the "Mercurial Diseases among Hatters," appeared in the published transactions for 1860, of the New Jersey State Medical Society, in which it was stated that more than one hundred cases of this disease had occurred in Orange alone. The symptoms were: "Swelling and ulceration of the gums, loosening of the teeth, fetor of the breath, abnormal flow of saliva, tremors of the upper extremities, or a shaking palsy and frequently some febrile action." These cases recovered under the usual remedies for mercurial salivation, especially iodide of potassium, or without any treatment if the work was abandoned for a time. This disease occurred exclusively among the hat finishers, and the presence of mercury having been established by chemical tests in the hat bodies before going through the process of finishing, it seemed clear that the hot iron volatilized the mercury, and the close, ill-ventilated rooms favored the absorption of it in the system, and so the workmen were poisoned. The greater prevalence than usual, of the disease at that time, was found to be due to the use of a larger amount of mercury in order to render poor

materials fit to work up into hats. The author suggested, therefore, that better material be used in the manufacture in order to admit of the diminution of the amount of mercury, and that the finishing room be large and well ventilated.

Some time after, a committee, of which Dr. S. Wickes, of Orange, was chairman, reported to the Essex County Medical Society substantially the same facts as those mentioned in Dr. Freeman's paper, and, after adding that most of the stock is imported, close their report as follows:

"The committee deem this a proper subject to bring to the notice of the State Society. In the eastern section of the State there is a very large number of this class of operatives, and they have a claim upon us as conservators of the public health, to do what we can in their behalf. The facts in the case should be brought to the knowledge of our representatives in Congress, that such prohibitory laws may be enacted, as shall secure the importation of proper and healthy materials. It may be proper to add that the importers have been appealed to by those interested in the hat manufacture, who declare that they cannot control or remedy the evil."

These two reports constitute all the available literature on the subject at our command. The dangers to workmen which they suggest as liable at any time to occur, and the fact that individual cases of the disease above mentioned come to the notice of the profession more or less frequently, prompted a more detailed examination into the whole business. To this end the wholesale dealers in furs, Messrs. White, 63 Broadway, and Hitchcock, Dermody & Co., 91 Mercer street, New York, were visited; also the factory of the latter firm on Park avenue, between Walworth and Sanford streets, Brooklyn, N. Y,, in which are employed about two hundred hands, then in full operation.

The factory of Messrs. White is situated in Danbury, Conn., and employs about seventy-five hands.

The following hatting establishments in Newark and vicinity, were also visited and inspected carefully:

NAME.	LOCATION.	NUMBER HANDS.
V. Hermann	42 Hunterdon street	42
Fairchild & McGowan	Market and Congress	125
R. & A. Fulcher	New and Hoyt	35

NAME.	LOCATION.	NUMBER HANDS.
G. Graah	227 N. J. R. R. avenue	23
E. Sealy, Jr	119 N. J. R. R. avenue	29
J. Schumann	457 Court	39
C. F. Seitz	31 Ward	127
C. Crossley	10 Front	134
Brown & Hyde	Kinnev and McWhorter	53
Tichenor & Klein	N. J. R. R. avenue and Green	56
W. Carrolton	61 Lock	63
Hoefler & Hoepner	25 Exchange alley	27
T. R. Austin	157 Summitt	28
Roth & Rummell	McWhorter	73
J. Mercy & Co	Market and Union	87
Mason	First street	26
E. K. Carley	144 Canal	59
Nichols & Mason	233 Central avenue	53
Yates, Wharton & Co	142 Commerce	260
C. B. Alston & Co	39 Liberty	40
E. A. Dodd	Jersey street	32
Stern & Co	1 Commercial wharf	11
Wheaton's	N. J. R. R. avenue and Market	17
Messrs. Gill	Orange, N. J	85
M. Mercy	22 Scott	65
		1589

In this work I have to acknowledge with thanks the very kind assistance rendered in making up the lists of the workmen, in some cases by the proprietors, and in others by the book-keepers, at the establishments of Messrs. Graah, Sealy, Tichenor & Klein, Carrolton, Mason, Yates & Wharton, Dodd, and Stern. The lists of the remaining factories were made mainly by Mr. E. P. Roberts, of Elizabeth, N. J., a graduate of the Stevens' Institute, Hoboken. The latter gentleman also prepared, at my suggestion, the appended summary:

In order to make clearer the nature of the dangers to which the operatives are exposed in this business a brief description is herewith subjoined of each process in the manufacture from the crude fur to the finished hat. Ordinary felt hats are the only ones studied.

"The furs most largely used for the manufacture of hats are those of the hare, coney and rabbit, all of them rodent quadrupeds belonging to the genus *lepus*, and differing mainly in size and the quality of their fur. The hare is the largest of the family and its fur is the finest. Great quantities of the skins of these animals are brought from England and France, where the breeding of them for market is a regularly established business of considerable magnitude. The English rabbit has been domesticated in Australia, and for a few years past the importations from that country have been large and increasing. Many hare skins come from Russia, the fur being a longer staple than the English, but not as fine. Wild rabbits are found in large numbers in our Middle and Southern States, and their fur is extensively used, though hardly equal in quality to the best from Europe.

"For the finer grades of felt hats, and more especially for fur caps, nutria and beaver furnish the choicest material. They are both amphibious rodents, closely resembling each other in general appearance, the principal difference being that the former has a round tail and the latter a broad, flat one. The nutria is a native of South America, and is very prolific along the rivers of the Argentine Republic. The beaver is at home in colder climates and flourishes in our Northern and Western States."

The preparation of the fur for hatting is termed "carroting" and the chemicals are called "carrot" from the fact that their action on the hair colors it yellow like the vegetable of the same name. A mixture is made consisting of 1 pound of quicksilver, 3 pounds of nitric acid and 13 pounds of water, this is stirred with heat until the quicksilver is entirely dissolved thus forming a strong solution of nitrate of mercury. This, with the aid of a short wisp brush, the hands of the workmen being protected by rubber gloves, is thoroughly rubbed into the hair, the skin being held firmly on an inclined plane and the hair brushed both with the grain and against it so that each hair, for about two-thirds of its length, is thoroughly wet with the solution.

These skins when dried in a well ventilated and heated room upon racks prepared for the purpose, are then sent to the brushing room, where each one is held upon a large rapidly revolving horizontal cylinderical brush, until the fur, matted down by the "carrot," is perfectly smoothed, freed from dust, loose hair and the adhesive particles of dried nitrate of mercury. They are

then sent to the cutting room. "The machines which shave the fur from the skins are fitted with sharp, swiftly revolving knives, which remove the fur in an entire sheet, the skin being reduced to shreds. Then follows sorting of the fur into several grades, and packing in five pound bundles." The small fragments of the skins which are torn off in the process of scouring, together with clippings purchased from furriers are carefully sorted, the larger pieces and those having longer and more valuable fur are laid aside to be cut by hand.

"The remainder of the furriers' scraps and all the clippings from the skins used in the factory, are put into a cylindrical machine, and indiscriminately mixed by means of revolving skeleton wheels. They are then spread upon endless aprons, and are thus carried into the mouths of the cutting machines. These machines have teeth something like the ordinary threshing machines. The skins are cut into small square bits, and the fur is removed after the manner of grain from the stalks. This hodge-podge of hide and fur is then screened. After passing from one machine to another the fur is entirely removed from the particles of the skins, is thoroughly cleansed by the process, and is ready for the packers. This is called short fur, and looks like thistle-down."

It is sold to the hatters at a lower price, to be used with the more expensive stock as "filling in" material.

This process of "carroting" the fur is evidently the one in which there is greatest liability to mercurial poisoning by reason of the concentration of that mineral in the wash employed. To guard against this and also against the corrosive action of the solution, the hands of the workmen are protected, as stated above, by rubber gloves. In the establishment of Messrs. Hitchcock, Dermody & Co., the workman longest at this branch of the business had only been employed about six years. He stated that he had never had the tremors but had suffered some from sore mouth and gums, and thought his teeth were beginning to be affected.

One of the Messrs. White stated that they have a number of old men in their factory, some of whom have at various times had the "shakes" and sore mouth, but that of late years there has been no complaint of these troubles since giving the workmen an abundant supply of fresh air.

He also stated that the demand for an increase of "carrot" in the stock has arisen within the past few years. The competition is so close and the margin of profit so small in the hat manufacture that employers are calling for a stock that will felt rapidly and thus materially reduce the time and expense of production. He stated that the process of "carroting" with mercury is a French discovery and was called "*le secret*," all knowledge of its use being for a time kept from other nations, and it being given out that only acids were employed for that purpose. Hence for years in the shops of Great Britain "carroting" was done with a mixture of one pint of nitric acid and four parts of vinegar, and the felting was aided by mixing with fur a certain proportion of Saxony and Spanish lambs' wool. Consequently the workmen were entirely free from mercurial diseases.

A microscopic examination of various specimens of fur which, by the kindness of Prof. C. F. Eickhom, of Newark, were made with his instument magnifying about eight hundred and fifty diameters, revealed the fact that the action of the nitrate of mercury on the hair was to roughen its edges and deepen the natural depressions which exist on its surface, evidently thus favoring the adhesion and entanglements of the parts composing the felted mass. It will be readily understood from this why a fur of short fibre, or inferior quality, should need a greater amount of the "carrot" to cause it to work up satisfactorily, and why workmen are thereby more quickly poisoned. In some instances all the hands in a shop have, in a few days, been either rendered unfit for work or their health seriously impaired by handling stock so treated, compelling the employers to return it to the dealers as unfit for use. Just what, in a chemical way, is wrought by the "carrot," could not be satisfactorily determined in the time at my disposal. Some suppose the whole effect of the drug to consist in its dissolving from the fur the oily and other animal matters which coat its surface, and so prevent the felting. It is a matter of such importance, however, that he who should discover the exact nature of the change produced in the fibre of the fur, and be able to suggest some agent less harmful than nitrate of mercury for the accomplishment of the same work, would certainly be saving hundreds of workmen from much suffering, and very many from the permature wasting of their powers and possibly early death. We heartily com-

mend the subject to the consideration of sanitarians, chemists and microscopists throughout the country.

The fur prepared, as above described, is now mixed by weight and shaken together by hand in various proportions, according to the quality of the hat to be made, from one-half to one-eighth part being a coarse, poor material called "shoddy," composed of short and inferior furs, trimmings of hat brims, &c., which is worked in with the finer qualities to save expense. This material is then passed through a machine called a mixer, in which the fur is passed between a pair of rolls and immediately seized by a cylinder, studded with wires, called a "picker," making eighteen hundred revolutions a minute, by which it is whirled to the top of an enclosing box. It then falls upon an apron and is passed through another set of rolls and over another "picker," by which the several kinds of fur are uniformly and properly mixed.

The same work is done in other factories by an instrument called a "devil," consisting of a cone set with spikes and revolving very rapidly in a case also set with spikes. A set of projecting flanges at the base of the cone produce a strong draught over its surface and the fur fed in an opening of the case near the top of the cone is by this current drawn between the whirling spikes and sent flying in a cloud in a close room which acts as a receiver. Here, as in the other machine, all grades are perfectly blended. After mixing, the fur is placed in a machine called a "blower," somewhat similar in construction to the mixer, but having sets of four to six pickers. Just underneath each one and leading from it to an endless apron is a grating, so inclined as to catch bits of matted fur and pieces of skin with fur attached, called "dags," also all the heavy, long and coarse hairs as by their weight they fall down from the revolving picker, which throws the fur to the top of a grated box, whence it falls upon an apron and is carried forward to another picker, and so on through the set, emerging from the last a delicate fleecy mass, winnowed entirely free from dust, dirt, hair and "dags." The "dags" are collected upon an apron and sent back to be again put through the machine, and at last are collected to be cut and torn for poorer material. The hair and other impurities are collected in a box underneath the machine and thrown away. In this department the air is constantly charged

with dust, so dense and heavy that everything is viewed through a cloud; and a stay of but a few minutes in the room produces in one unaccustomed to it a sense of dryness and unpleasant tingling in the nasal passages, with discharge of mucous which lasts for several hours after leaving the building. Even the next day, sixteen hours after spending about forty-five minutes in the room, the mucous discharged from the nose was discolored with the same dust as on the previous day on just leaving the factory. Showing that it had penetrated very deeply between the folds of the nasal mucous membrane. Some of the hands wear a thin cloth over the nose and mouth while at work feeding the machines and receiving the fur from them; others use no precautions. Boys are mainly employed in this work, but some men were found who had been so engaged for ten to twenty years. Some complain of catarrh, bronchitis, chronic coughs, spitting of blood and loss of flesh. Of thirty-nine hands, five are more or less affected. The dust is also loaded more or less with finely divided particles of nitrate of mercury from the "carroted" stocks.—hence some have suffered from sore mouth and tremors. Of the thirty-nine workmen, eight cases of these diseases were found.

This dust seems less injurious to the bronchial surfaces than that from metals and minerals, perhaps partly from the fact that it is chiefly of an animal nature and thus more readily softened by contact with the secretions of the mucous surfaces and so loses part of its irritating properties and being lighter than the mucous floats on the surface and so is easily expectorated.

Another reason for this difference is suggested by an English writer thus:—"Dust of every kind irritates, but not in an equal degree. Much I conceive depends on the size and figure of the particles which enter the air tube. The dust from the roads produces no apparent mischief, while the mason's chippings from the stone occasions serious and often fatal injury to his lungs. The dust from old iron, which is thrown off so copiously as to deposit a thick brown layer on the dress of the dealers in this article, produces no inconvenience; while the less apparent detachment of particles by the file is decidedly baneful to the workers in iron. It is then the form rather than the material, the spicular, the angular, or pointed figure of the particles detached, which we conceive the chief cause of injury. The

bronchial membrane is mechanically irritated or wounded, and from daily repetitions of this injury the lungs at length become seriously diseased, and a vast majority die consumptive." In very few of the shops visited is any effort made to get rid of this dust. In some establishments ventilators have been put in the ceilings of the blowing rooms, and one manufacturer stated that he had heard much less complaint of sore mouth since that change.

Without doubt, at a trifling expense, with the aid of a fan connected with the main shaft, a gentle current of air could be introduced at various points into these rooms, in warm weather from without, and in cold weather heated by a steam coil so as to make it comfortable for the workmen, and this being allowed to pass out at the upper part of the room would not only perfectly ventilate it, but carry off the greater part of the fine dust which now fills the room. If in addition to this the workmen were protected by close fitting respirators of cotton wool, such as are recommended by Professor Faraday, the greater part of the evil would be remedied.

The fur is next weighed out into parcels of from two and a half to five ounces, according to the size and quality of the hats to be made. Each is then spread separately upon the apron of a feeding machine supplied with a revolving cylinder similar to a "picker," by which it is thrown forward upon another large roller also studded with wire, which projects it forward and upward toward a large inverted cone, in the gill machine, open at the top, into which it is drawn by the action of a fan from the bottom. In the lower part of this open cone, upon a revolving pedestal is placed a perforated copper cone upright, between two and three feet in height, from whose interior the air is exhausted by the fan above mentioned. This latter cone being moistened and set in its place, and the door of the outer, enveloping, inverted cone being closed, the fan draws all the enclosed air immediately toward the copper cone and with it the fine spray of fur admitted to the top from the feeding machine. This fur by the revolution of the copper cone is then deposited in a uniform delicate thin film upon its surface. When the required amount previously weighed out has been laid on the cone it is covered with a conical cloth, sides and top, over which a metallic cover is placed and the whole removed to be immersed for a few seconds in a hot

water bath to contract and compact the material. The covers being removed, the cone is inverted and the felt gently loosened, stripped off and laid aside for further manipulation. In the Burr machine the copper cone is fed through an open funnel, the fur being blown by a fan and suction made on the inside of the cone, as in the Gill machine.

The hat now consists of an immense open bag, which when flattened out, measures from eighteen inches in breadth at the bottom by twenty-four in length for the smaller sizes, to thirty by forty for the larger. It is first subjected to a process called "hardening," which consists of gently rolling and pressing it in a cloth from side to side and end to end, so as to interlace the fibres of the fur more compactly. At the same time it is examined closely within and without, and if there are any thin spots they are patched with bits of fur with the aid of a brush, so as to make the body of uniform thickness. The hands in this department are called "weighers," "feeders," "coners," "wetters," and "hardeners." The first two are handling only the dry stock; the last three the wet stock. The "coners" and "wetters" have their hands moistened constantly with water in which there must be considerable nitrate of mercury in solution. Hence fourteen out of seventy-four workmen, about 25 per cent., have had some form of mercurial diseases. The "hardeners" hold the damp hats on the arms bared to the elbow, in order the more closely to inspect them by letting the light shine through, and so have a larger absorbent surface exposed to the action of the nitrate. Consequently out of thirty-nine men examined, 25 or over 60 per cent., are found to have had some form of mercurial disease.

Among these men inquiry revealed another class of ailments, evidently due to the same cause, namely, a wasting or diminution in size, not very marked but still noticeable, of the muscles, particularly of the arms from the elbows to the wrists; and this, notwithstanding these muscles were in constant exercise and so ought to be expected to increase in size and strength. In one case, besides the general shrinkage, there was a distinct depression between the muscles of the left forearm, so deep that an ordinary lead pencil would lie in the furrow. This man had been working thirteen years at hardening. He complained of impaired memory, lack of power of concentration of his thoughts,

had tremors and general muscular weakness; had not used stimulants for the last eight or nine years. Two others working thirteen and fourteen years respectively, have the same mental symptoms, also increasing physical weakness and diminished size of muscles, though not so marked as in the first instance. Of the nine "hardeners" examined with reference to this in three shops, six were more or less affected, and one of those exempt had only worked in that department sixteen months. In view of this condition and the special dangers in this department our manufacturers should be cautioned against attempting to work up poor materials at the risk of the health of their workmen. The mischief is evidently at the present time not due to imported stock, but to the effort on the part of our manufacturers to supply the market cheaply.

The conical bag above mentioned is now put into the hands of the "sizer" or "maker," who reduces its dimensions to that of an ordinary hat, by rolling it in a cloth and rubbing it back and forth with others on an inclined plank. Four to eight men work about one kettle of water, kept boiling by means of a steam jet. This water is acidulated with sulphuric acid, the action of this being to make the material felt more rapidly. Frequently the fingers are made sore at the edges of the nails, and occasionally when the acid is used in too large quantity the nails are eaten badly by it, and the fingers rendered very sore. These men are in a steam bath constantly, and in the Winter time this is so dense that it is impossible to see more than a few feet in any direction in the room. The frequent dipping of the hats in the kettle and the splashing and slapping of them on the planks splatters the water over the bodies of the men, so that they are most of the time wet. Hence in some cases rheumatic diseases are found among them. About 3 per cent. of the workmen examined report this disease contracted in this room. Only two cases, however, of mercurial disease of the whole number examined who had ever been "makers," probably amounting to four hundred and fifty, ascribe its origin to this department. The comparative exemption of this class from disease is probably due to several causes. The rooms are, as a rule, better ventilated than any others in the factories. For while there is a very small average air space to each man, as shown upon the appended table, yet the lattice work in the upper part of the rooms, with

which nearly all are supplied, is kept constantly open and so furnishes an abundance of fresh air. The work is vigorous and of itself would tend to develop strong active bodies. It is possible, even probable, that the addition of the sulphuric acid and the supply of an abundance of water effect decompositions and recompositions of the salts of mercury, producing several less readily soluble than the nitrate, and thus less deleterious to the workmen. Time did not permit a more critical and chemical examination of this matter.

As a result of these combined causes there is a much larger proportion of old men here than in most other departments of the business, the average ages being only exceeded by those of the "hardeners," "clippers," "dyers" and "blockers," none of whom have as hard work as the "makers," and would, therefore, naturally draw the older men to join them. Then, too, in past times it was customary for apprentices to learn several branches of the business, and as the finishers became incapacitated by age and disease from doing that work, they took position in the making room. In examining the men at work, one would infer in this room the existence of a better state of health than in most others, from the exuberance of spirits manifested. In many cases there was singing and laughing—in nearly all, loud, good-natured, hilarious talking, which was in marked contrast with the quiet of some of the other rooms.

After being sized properly the hats are sent to a drying room, heated to a temperature of 160° to 170° Fahrenheit, whence they go through the hands of a workman who dips them in a solution of shellac, either the brim alone or the whole hat, according to the final finish desired, whether a stiff brim and soft crown or an entirely stiff hat. They are then passed between a pair of rollers to press out any superfluous shellac, when they are ready for a second "sizing." This consists in passing them between a pair of rollers on the surface of which are prominent raised disks, inclined at such an angle to the surface of the roller as to give, when in revolution, a wavy back and forth motion. A number of the hats are rolled in a cloth so as to form a long bundle, which is then thrown in the midst of a set of four rollers of the above pattern, which turn it rapidly about, the disks giving a wavy motion to the surface of the rolls, and thus the size of the hats is still further diminished. They

are now taken to the blockers to receive the first stretching into a shape resembling a hat. Here one machine rounds out the crown somewhat, another pulls it over a cylindrical-shaped block, and at the same time seizes the brim, turns it up and stretches it into shape. It is now ready for the dyer.

Ordinary black hats are produced by successive baths, composed of logwood, copperas and verdigris. In the production of brown, blue, &c., the aniline dyes, bicromate of potash, many varieties of woods and various other substances are used by different manufacturers, some of which are irritating to the hands of the workmen if they have sores upon them. Inquiry failed to discern any specially deleterious effect from these processes, though many workmen, and some employers, were found who believe the "shakes" and sore mouth are due chiefly to impurities in the dyes. After dyeing and drying the hat is again blocked more thoroughly, when, after another drying, it is ready for "pouncing." After leaving the "makers," the processes of drying, stiffening, clipping, dyeing and blocking, seem to be comparatively free from disease. Only two cases of mercurial disease in the whole number of workmen examined refer their origin to either of these processes.

"Pouncing" consists in rubbing off, with the aid of a block of wood covered with a piece of emery paper, all the coarse, rough hairs, which in the process of felting the hat have gradually worked outward and are bristling from all parts of the surface. Formerly this was done by hand entirely and the air of the rooms in which the men worked was filled with dust; the floor, walls and ceiling were loaded with it. This dust was composed of particles of hair and fur, the "carrot" in the stock and all the chemicals used in the process of dyeing. A few cases of disease of the respiratory organs and also of mercurial disease are referred therefore to this department. Of late years in most of the shops this work is done in good part by machinery. Rapidly revolving conical rollers covered with emery paper clean the brim and another instrument sweeps over the crown set on a revolving block. Over each machine is placed an open funnel connected with a pipe leading to a larger pipe the air from which is exhausod by a rapidly revolving fan, so that a strong draught is thus made. The dust and hair are rubbed off and swept out of the room at once to the great comfort and benefit of the

workmen. In the manufacture of white hats in the pouncing room, preparations of French chalk or soapstone are rubbed into the body of the hat. No diseases seem to result exclusively from the use of these substances.

Next in order of sequence but first in importance in a sanitary point of view is the process of finishing. This consists, in the case of black hats, in ironing off smoothly with the aid of a little water the whole hat, crown and brim, with a very hot iron and shaping it to a particular pattern, if it be a stiff hat, upon a block or mould of the required dimensions. The workman is bending over the iron with his face but a few inches from his work, and this for the greater part of the working day.

Here there are conditions favorable to the absorption of mercurial vapors, viz., the highest temperature to which the hat has been exposed in the whole process of manufacture, thus permitting the volatilization of the contained salts of mercury, and the position of the workmen favoring the inhalation of the fumes as they rise. Hence of the one hundred and sixty-eight cases of mercurial disease whose origin is traceable one hundred and seven or 63 per cent. are found to have arisen in the finishing department. Of the four hundred and thirty-eight men at present employed in this work eighty-nine either now have or have had in the past some form of mercurial disease. Of that number only four admit that they now have the disease. This is accounted for in several ways. Several furriers who are said to have used large quantities of mercury, in "carroting" the stock, have gone out of the business. At the time these examinations were made during the months of September, October and November, all the windows and doors of the rooms were open, thus giving perfect ventilation and preventing the breathing in of the mercurial vapors. Again the style of finishing black hats has changed materially within a few years, less of what is called "glazed" surface being produced by the iron. The hatter now uses more moisture and developes a soft smooth finish without the gloss. The latter requires more persistent dry ironing and would be likely, therefore, to volatilize more freely the mercury in the fur. It should be remarked in this connection also that for one reason or another many of the workmen examined seemed unaware that they had any disease, whereas a critical questioning would frequently reveal evidences of it.

Many doubtless supposed they were answering honestly having failed to notice slight indications of disorder and so reported themselves well. For example one of the hardeners, above referred to, suffering from muscular weakness and wasting reported that he had no "shakes." Yet, on being requested to stretch out his hand there was a distinct tremor observable. Some were disposed to make light of the matter and gave frivolous and evasive answers. Some, no doubt, had a false pride in regard to a confession of ill health. Very few indeed would admit that the disease was contracted in their present places of work and were rather disposed to charge it upon some other shop. These facts being considered it will be readily inferred that the figures in the table appended will understate the numbers of those more or less affected by this class of diseases. In white hat finishing the dangers are much less, because the iron is used but little.

The subsequent operations, viz: trimming, flanging and packing were nearly exempt from all these forms of disease.

The trimmers attach the band, braid and lining to the hat. These are usually young girls. They work crowded in rooms often sadly ill-ventilated, as very little provision seems to be made for this in any of the factories. The average time in the business is short, for obvious reasons, many leaving it to enter upon married life.. Hence, no conclusions are readily deducible as to the healthfulness of their work. Like all persons of sedentary occupations they are rather disposed to look pale, thin and worn.

The flange, or curl, in the brim of the hat is set on the mould by putting on it a bag of hot sand, thus dispensing with the iron. In this work, therefore, no complaint of disease is made. The packing consists simply in putting the hats in boxes for the market, and of course involves no greater dangers than the subsequent handling and sale of them in the stores.

Attention should be called briefly to some significant facts exhibited in the appended table, and others which were developed in conversation with the employers as well as their men, and not here tabulated.

Each individual in the factories above mentioned was visited, and personal inquiry made as to all the facts in his history relating to the three classes of diseases specified. The dimensions

of the rooms were taken, and the number of the hands in each. It should be stated that the time at which these inquiries were made was near the end of the busy season, consequently fewer men were found at work than are often engaged. About fifteen hundred were employed, while the capacity of these shops is two thousand to twenty-five hundred hands. The figures representing the number of cubic feet of air space to one person would, therefore, be materially changed if the factories were full. The averages also are much raised by several instances of a few men being at work in very large rooms, *e. g.*, the packing rooms. In addition to what has been said in reference to ventilation in the blowing and pouncing rooms, particular attention should be called to the finishing rooms. Here the air is necessarily charged with poisonous vapors and should be renovated by artificial means. The most that is done in this direction in any shop is the furnishing of a skylight or open funnel with lattice work to permit the free passage outward of the heated air.

No provision is made for forcing into the rooms a current of pure air from without, thus insuring their rapid and perfect ventilation. It will be observed from the table that in this, the most dangerous work, the lowest minimum of air space of all is found, and the average is too low for health. Dr. Parkes estimates that fifteen hundred cubic feet of air per hour are necessary for each individual for healthy respiration. Of course a larger volume still is needful if it be vitiated by poisonous chemical fumes in addition to the carbonic acid gas exhaled in the breath. It will be seen that with an average air space of nine hundred and ninety-six cubic feet to a man, as in these rooms, in order to support healthy respiration alone the entire volume of the air of the rooms should be renewed every forty minutes. That this rate should be much increased when mercurial vapors load the air must be evident. All the manufacturers who have observed the health of their workmen agree in stating that mercurial diseases prevail much more extensively in winter, when the rooms are closed, than at any other time. The inference is clear, therefore, that wherever disease breaks out ventilation is insufficient. Undoubtedly if an arrangement were employed for drawing off the air from the finisher's bench, such as is in successful operation in the pouncing room for carrying away the dust and hair, there would be very little complaint of disease from mercurial

fumes. For so successfully does this little appliance act that the smoke from the pipe of a workman standing before it is drawn gently downwards and swept out of the room. Much more would the fumes from the heated iron just in the mouth of the funnel be safely disposed of.

All degrees of severity of mercurial diseases reported are included in the two classes, from a trifling soreness of the gums and tongue to entire loss of the teeth, and from a slight tremor of the hands and arms to such violent spasmodic jerking of the muscles as to render the patient incapable of feeding himself or carrying a cup of fluid to the mouth without spilling the whole or the greater part of it, the latter being accompanied by great loss of strength and manifest impoverishment of blood.

The column marked "where contracted," represents as far as could be ascertained, in what particular room each class of disease was first developed, taking the whole factory through, and is not confined to the number of workmen at the present in that room. Thus one hundred and seven report having contracted the mercurial diseases in black hat finishing, but a number of those are not now engaged in that work, having gone to other departments, since but eighty-nine now report the disease in that room.

Hence, two sets of figures were necessary, one to represent the present condition of the men, and the other to indicate where, including both past and present, the greatest amount of disease had been developed. A glance at the table shows that rooms 1, 3, 4 and 13 have developed most mercurial diseases; 5, most rheumatism, and 1 and 11 most respiratory diseases. The reasons for these results are evident from the description of the processes carried on in the respective rooms. Assuming that the numbers employed in the past are about the same as at present, in rooms 1, 3, 4 and 13, we have one hundred and fifty-nine cases of mercurial disease to five hundred and ninety workmen, an average of about 27 per cent.

In order to make some estimate of hereditary influences the occupation of the father was ascertained in each case. In the table is given only the number of those whose fathers were hatters. Of this number, twenty-six report having had mercurial disease. About 13 per cent. of those whose parents were not hatters had the disease, whereas only 11 per cent. of those whose

parents were hatters developed it. These figures are insufficient, however, as a basis for any general conclusions.

In conversation with the employers as to the diseases to which their men were subject, in fully three-fourths of the cases the statement was made that the chief cause of ill-health among them was intemperance. Since all writers on the articles used as medicines represent muscular tremors as one of the most common effects of the excessive and long continued use of alcoholic stimulants, it seemed necessary to inquire what proportion of the men were addicted to them, in order to judge, if possible, what influence this might have on the disease. The figures attached to each class represent a condition of things sufficiently deplorable to fully justify the statements of the manufacturers. Again, Dr. Phillips, of England, a careful writer on materia medica, and therapeutics, says of the chronic effects of tobacco: "general nervous depression has frequently been produced, showing itself in restlessness, insomnia and a tremulous condition of the limbs, not very unlike the phenomena of chronic alcoholism." Dr. H. C. Wood, of Philadelphia, says of nicotia in poisonous doses: "in one or two instances violent muscular tremblings have come on shortly after the ingestion of the poison and ended in general clonic convulsions." It is worth considering, therefore, how far the constant and excessive use of this drug may have assisted in the production of this class of diseases.

The data here likewise are insufficient, since the element of time is not taken into the account. Independent of that, however, taking only the classes of work in which the men have had the "shakes," out of twelve hundred and twenty-eight hands there are found—

800	using stimulants and tobacco, with 80 cases of shakes	10 per cent.
106	" " but not tobacco, with 8 cases of shakes	7 "
216	" tobacco, " stimulants, with 20 cases of shakes	9 "
75	" neither, with 8 cases of shakes	10 "

Of the whole number of persons examined, leaving out the weighers, feeders and trimmers, who are girls, and do not, as a rule, use either stimulants or tobacco, there are left twelve hundred and fifty. Of these nine hundred and nineteen, or seventy-three per cent., use stimulants, and one thousand and thirty-five, or eighty-two per cent., use tobacco. Of course very many of them use both to excess, thus wasting hard-earned wages, undermining health, destroying the peace and prosperity of families, and in some cases preparing the way for entrance into our

prisons and poor houses. He who shall succeed in so vividly and truly painting the dangers attending the use of these two articles as to deter healthy men from taking them, will confer a priceless blessing on humanity. Perhaps more is to be looked for from early training than any other agency, and it is incumbent on every sanitarian to urge the necessity of teaching thoroughly in all our public schools and institutions of learning the laws of sound health and right living. It may safely be assumed that one of these fundamental laws would teach that, to the human body in a state of healh, both stimulants and tobacco are not only worthless but positively detrimental.

CLASS.				DISEASES.													VENTILATION. Number Cubic Feet of Air Space to Each Man.			
				Respiratory Organs.		"Shakes."		Sore Mouth.		Rheumatism.		Where Contracted.								
	Number.	Average Age.	Average Time Hatting.	Past.	Present.	Past.	Present.	Past.	Present.	Past.	Present.	Mercurial.	Rheumatic.	Respiratory.	Number Using Stimulants.	Number Using Tobacco.	Maximum.	Minimum.	Average.	Number of Fathers Hatters.
1 Mixers and Blowers	39	31	7	...	5	2	2	1	7	...	...	14	...	5	18	30	8983	2580	3846	2
2 Weighers and Feeders	44	21	4	...	...	......	...	...	3	...	...	3	...	...	......	......	4000	1203	2415	4
3 Coners and Wetters	74	36	10	1	...	1	2	11	...	...	...	15	...	1	45	61	4000	1203	2361	4
4 Hardeners	39	38	17	...	...	14	3	8	9	1	...	23	1	...	9	15	4000	1203	2389	4
5 Makers	379	37	20	1	3	16	2	...	1	12	1	2	15	...	337	316	2215	284	869	86
6 Dryers	4	21	1	...	...	......	...	...	...	...	...	......	...	...	2	4	9000	3300	6150	......
7 Stiffeners	11	27	16	...	...	1	...	...	...	...	...	......	...	...	9	10	7200	825	3313	2
8 Clippers	2	56	30	...	...	......	...	...	...	...	...	......	...	...	2	1	572	572	572	......
9 Dyers	45	38	10	...	...	1	...	...	...	...	...	2	...	...	28	36	8250	366	2654	2
10 Blockers	16	40	21	...	...	......	...	...	...	1	...	......	...	...	9	14	2700	925	2050	4
11 Pouncers	118	30	10	2	2	4	...	1	...		...	1	...	4	98	100	8400	213	1417	13
12 Finishers, white	48	28	10	...	...	5	1	1	...	...	...	1	...	...	28	42	1400	514	939	9
13 Finishers, black	438	30	14	3	...	54	4	31	...	4	...	107	4	2	310	377	3686	200	906	87
14 Trimmers	252	23	5	...	...	......	...	...	...	...	...	......	...	...	......	......	1639	261	729	38
15 Flangers	19	37	11	...	...	2	...		...	1	...	......	...	...	13	15	5280	924	3369	5
16 Packers	18	22	11	...	...	2	...	3	...	...	...	......	...	...	11	14	26400	533	6886	5
Total	1546	32	12	7	10	102	14	56	20	19	1	168	20	12	919	1035	6108	944	2559	265

Springs, Wells and Cisterns as Sources of Drinking Water.

BY PROF. H. B. CORNWALL, E. M.

A good well has always been regarded as a most valuable possession, and no water is more wholesome and palatable than fresh, cold, pure well water. To secure such a well wherever it is possible is an object worthy of much trouble and expense. To secure a good substitute for it when the well cannot be obtained should be no less the aim of every householder.

That good drinking water should be cold, clear, colorless, odorless and free from any taste, beyond the natural taste of fresh, cold, well water, as opposed to *flat*, boiled water for instance, is known to all.

So also it is generally admitted that drinking water should not be too hard, and should contain no poisonous mineral substances, like copper, lead, or arsenic compounds.

Let us review these requirements somewhat in detail:

Water, even in wells in peaty districts, may show a slight brownish tinge, when viewed from above through a depth of twelve or fourteen inches, and may yet not be bad to drink, particularly for people already accustomed to its use. Strangers are, however, liable to suffer from slight diarrhœa when drinking such water.

Drinking water must be odorless. Many well waters are free from odor when fresh and cold, but if kept for a few hours in a clean bottle in a warm place, they show a decided and generally unpleasant odor, on being well shaken. It may be taken as an invariable rule that no such water is thoroughly wholesome; on the contrary, it should always be regarded with suspicion, and never used except with the precautions to be given later. Still more certainly bad is any water which has an unpleasant odor when

fresh from the well. Persistent use of such water will not fail to affect generally the health of those drinking it.

This question of odor is important, as it is one very valuable indication of the character of water. Many seemingly good waters give off a mawkish, unpleasant odor when boiled, in a tea-kettle for example, and they are to be regarded with suspicion.

As regards the taste, it is very desirable that water should be as sparkling and fresh as possible, and every good water will have these qualities, due to the presence of oxygen and carbonic acid gases. Still, many very unwholesome waters have been preferred because they seemed especially fresh and sparkling. The very impurities which had contaminated them had charged them more highly than usual with the carbonic acid, without imparting to them any unpleasant taste or apparent smell.

The taste due to *hardness* of water we will consider separately. This hardness is caused generally by the presence of an undue amount of carbonate, sulphate, nitrate, or chloride of calcium (the metallic basis of lime) and magnesium.

The agreeableness of such waters is a matter of taste or habit, and to habit in a great degree is due their good or ill effects on the system. It is well known that very hard water affects, at least temporarily, the bowels of almost all strangers accustomed to softer drinking water, but although eminent authorities hold opposing views on the subject, the general verdict on the question of hard or soft waters is, that no effect on the health can be certainly traced to the use of the softest waters or of moderately hard water; while very hard waters are universally condemned.

Some waters become soft on boiling, because the carbonic acid gas they contain is in part expelled and the carbonate of lime or magnesia which this gas held in solution is thrown down as an insoluble powder, generally appearing as a light colored coating on the inside of the vessel.

When the hardness is due to sulphates, chlorides or nitrates, boiling does not improve the water. The hardness of water is measured by ascertaining how much solution of soap, of known strength, is required to form a lather with a given quantity of the water. The test depends upon the well known fact that hard water forms with soap an insoluble compound, so long as the soap is not in excess of the mineral matters that decompose

it. The hardness ascertained by this test is reckoned in degrees and as it is assumed that all the hardness is due to lime, it has been agreed in England to call one grain of carbonate of lime in seventy thousand grains of water one degree of hardness. Five degrees of hardness is all that should ordinarily be present, but ten or twelve, or even somewhat more may not be too much, provided the water owes its hardness to carbonates, and so becomes much softer on boiling.

The presence of other metallic salts, like iron salts, in notable quantity, renders water unwholesome through the bad effects on the bowels, while even very small quantities of copper, and more especially of lead, produce specific poisonous effects. No water should be drunk which contains enough iron, lead or copper in solution to cause the slightest dark coloration when the water is slightly acidulated with two or three drops of muriatic acid and then mixed with several drops of sulphuretted hydrogen water, well stirred, and viewed from above through a depth of four or five inches in a glass tube held over white paper. Lead or copper are thus at once detected; iron needs the further addition of a few drops of ammonia water, to give to the whole a smell of ammonia when well shaken up. From one-fifteenth to one-tenth of a grain of lead or copper can be thus detected in 70,000 grains of water, and no water which contains so much should ever be used habitually. Hundreds of cases can be cited of lead poisoning, colic and paralysis due to water. Lead and copper get into water from leaders on roofs, from lead pipe and linings in wells and cisterns, and occasionally copper comes from the soil itself. It is true that well and spring waters generally contain mineral salts which soon form on the pipes an insoluble coating of lead salts, and thus protect the lead from further action, but many well waters contain chloride, nitrates and other salts which rapidly and persistently dissolve the lead, and the same is almost invariably true of rain water. No lead should therefore be allowed to come in contact with any water unless actual experiment has proved that the water soon ceases to attack the lead. So dangerous is the use of lead pipes and linings in rain water drinking cisterns, that it should in all cases be condemned without waiting for a trial, and even in case of well or spring water, the water that has remained standing in the lead pipes over night should never be used. These facts are too well

attested to require further notice here, especially since it is so easy to guard against them. Zinc is less dangerous, but neither zinc, lead nor copper should be used on roofs or any where else where drinking water is collected, nor should rain water or soft spring or well water be conveyed through any considerable length of lead pipe. Tin-lined pipe, well made, is perfectly safe, but much tin-lined pipe is badly put together or not lined with pure tin, and therefore it should not be too implicitly relied upon, unless put up by the most trustworthy persons.

Having now considered the most evident qualities of drinking waters and pointed out the precautions to be taken against the mineral, or organic impurities, we come to a more generally important, because more widely spread and less obvious class of impurities, viz: the organic impurities.

It is these that give to waters their malarial properties, these that aid the spread of typhoid fever, and these that, if not manifestly to blame, may justly be suspected of causing a great deal of troublesome, if slight, feverishness, dyspepsia and general ill health. That this is so will not be a matter of surprise when we consider whence the organic impurities are largely derived.

The organic matter in water comes partly from the air, where it is floating in very fine particles. So much of it is washed down by the rain, especially by the first rain after a long dry season, that the rain water often acquires an offensive odor after standing some time in a warm place. Even after a long continued rain the air still contains slight traces of organic matters. These are of both animal and vegetable origin, but consist mainly of dead matter.

When rain water reaches the surface of the earth it finds abundance of vegetable matter, and from this, especially when the late Autumn has covered the ground with dead and decaying vegetable remains, the water extracts an abundance of soluble compounds very prone to putrify. Just as a decoction of grass put in a bottle in a warm place soon smells bad, so do these vegetable extracts tend to become offensive also. If the ground is strewn with dead animal matter, or with excrementitious matter, these give up soluble compounds in abundance to the water. The roofs of buildings likewise furnish a very considerable quantity of similar impurities.

When the water penetrates into the ground it takes up not

only mineral compounds, but if the soil has been overcharged with vegetable or animal matter before, it also extracts from these a still further quantity of putrefiable and soluble materials.

Upon the quality and quantity of the compounds with which the water is thus charged, its properties will largely depend.

The most injurious of these organic matters are the nitrogenous, or as they are often called, albuminoid compounds. These are prone to change, easily putrefy or ferment, and when in the process of decomposition are without doubt capable of inducing very serious sickness. Thus, severe attacks of diarrhœa and obstinate fevers, generally termed malarial, have been proven to prevail among persons using water contaminated only with vegetable organic matter. Animal organic matter has the same tendency, but when the animal matter is excrementitious, when it comes from house drains, sewers, and the like, it may possess far more dangerous properties. It seems probable, but has scarcely been really proven, that water highly charged with such contamination can originate dysentery and typhoid fever; or at least diseases assuming a very similar type. Even although this be not admitted, hundreds of cases can be cited to prove that water once charged with the discharges of patients suffering from typhoid fever or cholera does produce in other persons these same diseases. Some instances to prove these statements will be cited hereafter.

It appears then that much rain water and all surface water, that is, water that is wide-spread over the surface of the ground, is charged with more or less organic impurities. Fortunately the earth itself has a great purifying power. These nitrogenous, putrefiable matters are rapidly oxidized as the water percolates through clean earth, and this natural filtration under ordinary circumstances entirely changes them into harmless, simpler compounds. The change is effected partly by the oxygen of the air contained in the earth; partly, and perhaps chiefly, by the agency of the minutest living organisms, and the products are harmless nitrates and nitrites.

The great purifying power of earth was tested by the Commissioners on the Pollution of Rivers in England, and the following is quoted from their first Report, *Vol. I, p. 69*: "Our experiments also appear to show that, if the soil be not overdosed with sew-

age, it will retain its efficiency for a long, if not for an unlimited period of time, and its pores will not become clogged up." "The cleansing power of a soil seems to be more closely connected with physical condition, as regards porosity and fineness of division, than with its chemical composition." "The nitrifying or purifying power of a soil is not interfered with by moderate cold." A very porous gravel and a light loam were found most efficient, while a light sand was inferior. It may be added, that compact, clayey soils are also less rapid purifiers of water. The above facts are worthy of careful consideration. The earth must not be overloaded with impurity. The commissioners state that one cubic yard of the most efficient soil could purify 9.9 gallons of ordinary sewage daily, if it drained through a depth of six feet, but this was only the purification which they thought necessary before the sewage should be turned into water courses or rivers, and was only accomplished by an intermittent filtration, allowing air to enter the earth at frequent intervals. When the earth is overloaded it is found that the water actually takes up additional impurities from it.

Moreover, it is generally admitted that while the ordinary organic matter even of sewage may thus be rendered harmless with comparative facility, yet when specific diseases like typhoid and cholera have imparted to water their specific properties, whether these be regarded as germs, as chemical compounds, or as of inexplicable nature, a far more thorough and prolonged action of the earth may fail to render the water harmless.

In a little town in the Canton of Basel the inhabitants were supplied with water from public fountains, which were fed by a hillside spring. This spring was known to communicate underground with a brook three-quarters of a mile away, on the other side of a hill, the soil of which was comparatively loose, being regarded as the moraine of an ancient glacier. A solitary farm house stood near this brook and the farmer, returning from a journey, was seized with typhoid fever. Within two months, at intervals, three others of his family were attacked and toward the close of this time the fever broke out in the little town, which had never had before more than a stray case. Soon 17 per cent. of the inhabitants had been sick, and as a very few who did not use the public fountains escaped, suspicion was directed toward the hillside spring. About a ton of salt was poured into

the brook by the farm house, and its presence was soon shown in the fountains of the infected village. Then about two tons of flour were mixed with water and thrown into the brook, but not a trace of it came through the hill. The poison of the typhoid fever, introduced into the brook with the slops and by washing the clothes at the farm house, found its way through the three miles of earth which effectually removed the finest grains of flour.

This is a remarkable case, but similar ones have occurred elsewhere. A gentleman residing near Princeton brought a sample of his well water for analysis. A colored man had brought typhoid fever with him from a distant place and died; another member of the household died of typhoid soon after, and two others who used the well were attacked. Analysis proved that the well was contaminated with sewage, probably from the house drain; the well was abandoned and the patients recovered. It is needless to recite more examples, but the fact must be remembered that once a water is contaminated with the discharges of persons suffering from certain diseases, it is possible for the water to communicate these diseases after an apparently thorough purification. Nor do these defects show themselves only among the weak; healthy persons are quite as liable to attack.

In Manchester and Salford, England, the cases of cholera were reduced to one-sixteenth by the introduction of pure water.

When these specific causes of disease are absent the impure waters do generally affect the weaker persons more readily, as was the case in one particular family in Princeton, N. J. It seems, too, as if by constant use persons may become less liable to injury from ordinary impure water. In this way an English writer explains the fact that many rural and seaside resorts show no excessive mortality among the regular inhabitants, while the unfortunate summer visitors suffer severely.

By what means can the nature of the impurities in water be ascertained? Analysis cannot determine whether the specific poisons of typhoid or cholera are present; the embryos of parasites may escape the most careful microscopic examination; it is not possible, within certain limits, to say how long a dangerous water will continue to be dangerous; still, analysis very often serves to detect danger where it was hitherto unsuspected, and very often analysis can determine whether the impurity is of

vegetable or animal origin. It may therefore, prove a valuable aid in discovering the cause of sickness.

Organic impurity of a dangerous nature from vegetable matter shows itself in water by the presence of an undue proportion of carbon and nitrogen, or of ammonia nitrates and nitrites, the products of decomposition and oxidation of the organic impurities. If the impurity is of animal origin, and especially if it is sewage, chlorine, and often phosphoric acid, will be also found in excessive proportions.

The larger the proportion of nitrogen to the carbon in any given amount of organic impurity, the more injurious is the impurity ordinarily, for the highly nitrogenous compounds are most prone to putrefaction. Accordingly, a method of determining this proportion has been perfected by Dr. Frankland and it is very reliable, but since it is only to be trusted when executed with utmost care, and since it is very tedious in comparison with other methods, it is generally only adopted when the absence of other known facts renders one of the easier methods inadmissible. If the conditions of the water supply can be carefully studied the process known commonly as Wanklyn's process affords a very expeditious and safe method, worthy of confidence in experienced hands. This method consists in determining the amount of ammonia existing as such in water, and also the amount of ammonia which the water will further yield when boiled with a strongly alkaline solution of permanganate of potash. Taken in connection with the amount of chlorine found in a sample of water, with also the nitrates and nitrites, if necessary, this method gives very reliable results where the conditions of the water supply can be carefully studied, as is almost always the case with wells and cisterns. The nitrates and nitrites may become necessary guides where the organic matter has been quite largely oxidized, especially if the chlorine determination is doubtful in its indications.

Assuming that that the oxidation has not been unusual, the following rules may be taken as guides in the interpretation of a well water by Wanklyn's method. The ammonia already present in the free state or combined with an acid, and called always free ammonia, should not exceed .08 parts per 1,000,000; if it does, especially when an undue amount of chlorine is present, it is almost certainly a sign of recent contamination by animal ex-

creta. The ammonia derived from the nitrogenous compounds by boiling with the permanganate solution is called albuminoid ammonia. It should never exceed .15 parts per 1,000,000, and in combination with much free ammonia even 0.05 to 0.1 parts per 1,000,000 is very suspicious; in presence of much chlorine it is an almost certain indication of sewage contamination.

Chlorine varies in normal quantity according to location. Near the seashore the salt water, containing much chloride of sodium, or common salt, may increase the normal amount of chlorine in well water very largely; but generally there should not be over 1.5 to 2 grains of chlorine per gallon of water in good well water.

Generally speaking, a determination of the free ammonia, albuminoid ammonia and chlorine suffice; the nitrates and nitrites serving as valuable guides in cases of doubt. The nitrates and nitrites may come from vegetable impurities alone, but if they occur with chlorine, in excess of the normal amount, they, too, indicate animal impurities.

Below are given a few examples of well water, good and bad.

NO.	FREE AMMONIA.	ALBUMINOID AMMONIA.	CHLORINE.
1	.016	.036	2.
2	.066	.08	2.5
3	.054	.098	2.7
4	.04	.14	3.6
5	.09	.16	1.6
6	.066	.434	5.05
7	1.36	.28	8.5

No. 1 always has been one of the best wells in Princeton. No. 2 is near a surface drain leading from a stable. It was long suspected and is now abandoned. No. 3 is near several privy vaults, some in use, others abandoned. A strong man using it was severely attacked with typhoid fever. No. 4 is near several old vaults. The owner says it almost always caused diarrhœa among strangers using it. The comparatively small free ammonia accords with the fact that the drainage is not recent. No. 5 shows little chlorine, and this accords with the fact that the impurity is mainly vegetable; the well is shallow and in a field, so that the Autumn rains charged the well with water laden with vegetable matter. The well frequently smells bad in the Fall. No. 6 is the well before referred to as having probably spread

typhoid fever. No. 7 is a well manifestly exceedingly impure from sewage. It is near a privy vault, and naturally those using it suffered constant attacks of sickness, and even of typhoid fever, before it was abandoned.

Cistern water unless collected with care, may be more charged with putrescible organic matter than an exposed well water, and it will be decidedly unwholesome; but when it is so impure, especially in warm weather, it generally acquires a more offensive odor, which prevents its use.

Below are analyses of some cistern waters.

NO.	FREE AMMONIA.	ALBUMINOID AMMONIA.	CHLORINE.
1	.05	.16	.175
2	.52	.16	.2
3	.10	.08	1.
4	.02	.02	.2

No. 1 is a fair ordinary cistern water, after heavy fall rains, and neither very good nor very bad to drink. No. 2 is similar; the large amount of ammonia is doubtless due to the presence of a rusty iron pipe, for iron rusting in rain water evolves considerable ammonia. No. 3 has five times as much chlorine as average rain water—the cistern received drainage from a cesspool, and although it has less albuminoid ammonia than Nos. 1 and 2, the free ammonia and chlorine together show where the trouble lies. The water had a very bad smell. No. 4 is a carefully collected and filtered cistern water. Nothing could be better to drink, and more is to be said about this sample hereafter.

Ordinarily, cistern water may be regarded as better than an equally impure well water, for the chances of animal contamination, and consequently of specific disease, are reduced to a minimum. Still cisterns become very unwholesome, by absorbing foul gas from drains, or by leaks admitting drainage.

Water analysis can hardly be undertaken by the inexperienced. A simple test for chlorine has been given in the first report of the Board of Health of New Jersey, 1877, page 84. Very often a dangerous water can be detected by its odor. If it is kept for a day in a closed bottle, half filled and set in a moderately warm place, it will smell bad on being violently shaken,

or still more certainly if it is then heated nearly to boiling and the smell tested frequently during the heating.

How can good water be secured? By keeping impure rain water and surface water from running directly into the wells, springs, and cisterns; and by preventing sewage and excess of soluble vegetable matter from overloading the earth through which water reaches the wells and springs.

The surface water will be so much purified by draining through a moderate depth of light loam, such as the soil of granite districts, or by a somewhat greater depth of sandy soil with a moderate amount of loam, that under ordinary circumstances, in the sparsely settled country, any well sunk to a depth of twenty-five feet or more is certain to be good. It is only necessary to take care that no broken drains run near it and that no cesspool or privy vault comes nearer than one hundred feet. Such security is possible, however, only where the porous, loamy soil is itself deep.

If a light soil of only a few feet covers a heavy, compact clay, the drainage from the cesspool or vault, especially in rainy weather, may run between the clay and the light soil to an unexpected distance, particularly when the slope of the clay bed favors this course. Under these circumstances a well might be contaminated at a distance much greater than one hundred feet. Careful study of the ground, below as well as above the surface, will aid in determining the relative location of well and drain or vault under such circumstances. A further safeguard consists in sinking the well through the clay into lighter soil below, if possible, or at least in sinking it several feet into the clay and lining it with a wall running nearly to the bottom, so tightly cemented as to exclude all water that has not been forced to pass through the clay also.

A shallow well in light soil covering clay is almost certain to be overloaded at times, with vegetable matter at least. In boggy or marshy land, too, these shallow wells, only ten or fifteen feet deep, are necessarily impure. The water from them will smell bad in summer, and is especially liable to cause malarial troubles. Often a new pump log yields enough soluble matter to make a well very offensive.

Surface water must be excluded from all wells, then, in very sandy or marshy soil, or in light soil underlaid at a depth of a

few feet by heavy clay. Wherever the water supply is abundant enough the *driven well*, consisting of an iron pipe forced into the ground, partly by boring, partly by hammering, serves excellently.

Surface water is perfectly excluded, for the water can only enter a perforated section at the bottom of the tube. In sandy soils these are much to be recommended, for it must be remembered that sandy soil lets impure water pass rapidly through it, and so does not as perfectly purify it as would a somewhat more compact loam. Marsh water is also kept out, if the pipe be sunk deep enough. In case of a light soil, with clay at a few feet below the surface, the pipe should go through the clay into light soil below, if possible. If not it will generally be found that the water supply from a *driven well* will be deficient. Clay soils are not suited to them, and recourse must then be had to the dug well, tightly lined with a cemented wall.

Compact rocks do not generally supply enough water for a well; fissured rocks are decidedly dangerous under some circumstances. If a fissured rock lies a few feet below the surface the cracks in it may act like so many pipes, carrying nearly undiluted drainage to a great distance. A gentleman finding his well, near the house, spoiled by a cess pool, dug another deep well at a distance of seventy-five feet or so from his cess pool, the top of the well being several feet higher than the top of the cess pool. Before the well was finished a little stream of foul water began to trickle into it, having come from the cess pool through cracks in the rock. The rock was the red shale and sand stone of New Jersey, and the general course of one system of cracks lay in the direction between the well and the cess pool. The gentleman wisely abandoned the well and constructed a suitable cistern, furnishing the excellent water before mentioned.

In the country there should be no trouble in getting good water, but the little streams that run through low meadows, and often supply houses with drinking water by means of shallow wells or hydraulic rams, are very liable to be bad.

In more thickly-settled villages and country towns the difficulty is much more serious. If the soil is good, and the drainage thrown into it by means of cess-pools and vaults is well managed and not excessive, there need even here be little trouble; but if the soil is sandy, or if it is sand over clay, or a light soil with rock at little depth, great care will not obviate all

danger, while the gross negligênce usually manifested everywhere brings its train of sickness with it. In such towns, not provided with well-built sewers, no water-closet should be allowed; cess-pools for kitchen drainage should be forbidden; privy vaults should not be made receptacles for even the chamber slops, and they should be protected from the entrance of surface water during heavy rains by means of tightly cemented walls. They should also be cleaned out regularly and often.

"Out of sight, out of mind," is the rule. If the householder can only get rid of all this refuse by putting it under ground he is satisfied, not stopping to think what becomes of all the water unnecessarily thrown into the filthy receptacles. It is this excess of water that does the main harm. It must go somewhere, and a well, being a very deep drain, the pressure toward it from all sides is great. The cess-pool, located from convenience or supposed necessity, within fifty feet or less of somebody's well, must contaminate it in time, unless the most favorable conditions exist. A light sandy soil may soon show the bad effects; a clay soil more slowly, but not less surely; a thin soil over clay or rock very certainly. Nor is the danger always manifest. General ill-health exists for a long time; perhaps no one is seriously affected until specific poisons are transmitted through the drains or vaults, and then suddenly an epidemic prevails. In the case of the well water referred to as No. 6 in the previous list of analyses, the water was contaminated at a distance said to be about one hundred and fifty feet; it had been so contaminated in all probability for a long time, but the presence of the typhoid patient first made it peculiarly dangerous. There is no escape from the conclusion that, so long as our present *convenient* systems of water-closets, drains, cess-pools and ill-arranged vaults is allowed, so long danger exists in every well in crowded towns.

If the well water must be used it should be thoroughly boiled; not a drop of unboiled water should be drunk from a well, unless the fact is established, that that well is supplied with pure water.

This is not the place to dwell upon the other sanitary aspects of bad drainage in towns; we have only to consider the water supply.

There exists everywhere, except in large manufacturing places, an abundant source of pure water, the sky. Let several hours

of drenching rain thoroughly cleanse the air, the roofs and leaders; then let the rain water run, from a slate roof if possible, into a cistern kept exclusively for drinking water. In families this cistern should be rather small, so that it can be cleaned at least twice a year, on the approach of a long storm. It should be cemented tight, sunk in the ground, kept well covered, the overflow carefully guarded against access of animals or foul gases, and the light Summer rains should on no account enter it. Then it will always furnish sweet, clear water. In Summer the water will not be cold as well water, but that fault can be remedied by ice. Where this is impossible, large, *unglazed* earthenware vessels, holding six or eight gallons, filled with the water, covered and set in the open air, in as windy a place as possible, but in the shade, will be found to supply cool water freely. The water is cooled by the evaporation of the water that slowly oozes through the unglazed vessels. This is the method almost invariably used in tropical countries, especially where rain falls only during a part of the year and must be stored in large cisterns. It is to be regretted that the custom has not found a place here. The vessels must be scoured occasionally with clean sand and water, and then scalded thoroughly. They could be cheaply procured if there was a demand for them, and they last a long time before the pores become clogged.

Such cistern water will not ordinarily require filtering. If it is desired to filter it, in order to make sure that no parasitic embryos shall be taken into the system, the best filter is a simple glazed earthenware jar, holding five gallons, or even less, having a double bottom. The upper bottom has a small hole closed by a bit of sponge; the space of four inches or so between the two bottoms is packed with clean gravel, above which is fine clean sand; the lower bottom is perforated with very fine holes through which the water slowly passes to an earthenware vessel below, into the top of which the filtering vessel tightly fits. The water is drawn off from the lower vessel by a faucet. If this lower vessel is unglazed it will serve at once as a cooler and reservoir. Such filters and reservoirs are now largely made, except that the reservoir is also glazed, necessitating in Summer, the use of ice, for such filtered water is very flat at first.

An easier and much more thorough way of securing absolute purity in cistern water is to boil the water for half an hour and

then put it into the stone jar, dispensing entirely with the filter. That is the method followed by the writer, using an ordinary cistern. The jar must frequently be scalded. In Summer the water of the ordinary cistern becomes too foul, however, if it has to supply all needs, thus making it necessary to collect all the rain that falls.

These small filters should be cleansed by scalding the sponge weekly, and removing and scalding the sand and gravel at least four times a year, or they may become breeding places of worms, etc. The filter, too, should not be kept full, but a pail of water is to be poured into it and allowed to drain completely off before any more is added. Five gallons a day is as much as the small filters just described can cleanse thoroughly.

Where the drinking water cistern must supply a large number of persons it becomes very troublesome to boil the water, and then it is advisable to place within the cistern a large box-filter of sand and animal charcoal, from which the water is pumped for use. Such filters must be renewed twice a year, to ensure their perfect action; so much of the charcoal, at least, must be replaced by fresh as seems to be most affected by the impurities.

Filters cannot be relied upon to purify a really bad water. The best of them will speedily become so foul that they will render the water even worse. If a bad water must be temporarily used there is no resource but to boil it thoroughly. For domestic use, with already very fair water, the above small sand filter is recommended because it is so readily cleansed, but it is only meant to further purify water already good. No reliance is to be placed upon the statements that this or that filter will last for a year or more. Finally, a well water, ever so slightly contaminated with specific poisons, like typhoid discharges, cannot be certainly rendered harmless by any amount of filtering. The well water must be boiled if it is bad, or it must be abandoned. The filters are useless with poor wells, needless with good ones, and only recommended for rain water cisterns.

Let no lead or copper come in contact with the rain water, not even lead paint. If a pump is used let its pipe be simply iron, or if that is objectionable from rusting, have cast iron pipes, which can be very effectually protected from the action of the water by plunging the newly cast pipes heated to 500° Fahrenheit into a bath of melted pitch and heavy mineral oil, heated

to about 450° Fahrenheit. This coats them with a permanent varnish.

Descriptions of the larger filters for cisterns may be found in Eassies' *Healthy Houses*, published by D. Appleton & Co., New York, and also in Knight's *American Mechanical Dictionary*, published by Hurd & Houghton, New York.

Animal charcoal is recommended for these enclosed filters rather than simple sand, which is better adapted for intermittent filtration, with frequent access of air.

VACCINATION.

BY E. J. MARSH, M. D.

It is almost impossible for an inhabitant of a civilized region at the present date to realize or form a distinct conception of what smallpox was before the discovery of the protective power of vaccination, and yet a faithful representation of its horrors and terrors at that time is necessary to enable us to appreciate our present advantages, to make us carefully guard our precious prophylactic, and at the same time diffuse its benefits, unaccompanied by any danger, as widely as possible among mankind, and in so doing honoring, above all other benefactors of humanity, the name of Edward Jenner.

It is unnecessary to investigate the origin of smallpox, whether it has existed for thousands of years, as long as our written records of history extend, and was one of the numerous forms of disease described by those ancient writers under the common name of "plague." It was first accurately described by the Arabian physicians, and was probably first introduced into Europe in the sixth or seventh century. The first recorded case of smallpox under this peculiar name is that of Elfrida, daughter of King Alfred.

Since that time it has always existed in Europe, though, owing to its peculiar characteristics, not with a uniform degree of severity. These characteristics are a great fatality, extreme contagiousness, and the power of affecting every individual, but affecting them only once in a lifetime. Hence when a district remained free from it for some years, it would be brought by some casual traveller, or perhaps parcel of wares, and thereupon it would quickly spread to those within reach, and the circle of its influence widen until all became affected; then the epidemic would disappear through exhaustion of material, and perhaps it might not be seen for many years and until a new generation had sprung up. From the larger cities smallpox was seldom

altogether absent, but prevailed with varying degrees of severity; like a forest fire at times blazing furiously, then subsiding under the influence of rain or for want of combustible material, smouldering and creeping along quietly, and breaking out unexpectedly with renewed violence.

There was no disease so contagious as smallpox. Sir Thomas Watson writes, "there is no contagion so strong and sure as that of smallpox, none that operates at so great a distance. It is readily communicable in every way; by inoculation, by breathing a contaminated atmosphere, by the contact or vicinity of fomites (clothes, bedding, &c.) Nay, it may be caught from the dead body." Every person was susceptible to the disease, the exceptions at most being extremely rare. It has been estimated that, of every hundred persons born, only four reached the age of thirty years without undergoing smallpox, and a middle-age proverb says: "From smallpox and love few remain free."

It was one of the most fatal of all diseases. About one-fifth of all attacked died. Among infants its death rate was fifty per cent. or more, and the same was the case in old age, but during youth and middle life a large proportion recovered. In some fortunate cases the disease was very mild and the patients recovered with only a few pock marks. In others the face was deeply disfigured, or the constitution was enfeebled and broken down, while a few completely lost their eyesight. Before the time of Jenner thirty-five out of every one hundred cases of blindness were caused by smallpox. Now it is seldom met with from this cause. The Napoleon medal in honor of vaccination represented Æsculapius protecting Venus—the god of healing protecting the goddess of beauty—and one of the most distinguished French writers on hygiene enumerates the benefits of vaccination as follows: "It has diminished the number of blind, protected the native beauty of the human race, prolonged the average of human life."

During the eighteenth century thirty thousand persons died annually in France of smallpox, and during the last thirty years of that century the mortality from the same cause in England was from thirty-four thousand to thirty-six thousand. And for those whose minds are impressed by large numbers it will be interesting to state that during the hundred years preceding

vaccination smallpox is calculated to have destroyed forty-five millions of the people of Europe.

We have few mortality reports of our own country during the last century, but the following is probably a fair representation of what was passing elsewhere as well. Smallpox was introduced into Boston in 1721, after an absence of nineteen years. The population was about sixteen thousand, and within two years the disease attacked six thousand persons, of whom eight hundred and forty-seven died. There was another epidemic of smallpox in 1752, during which five thousand five hundred and forty-two persons contracted smallpox, and two thousand one hundred and thirteen others were inoculated, or nearly half the population was affected with the disease. The burial records of New York show that during the fifteen years preceding vaccination five thousand seven hundred and fifty-six persons were buried in St. Paul's and Trinity church yards, six hundred and ten or more than one-tenth of whom died of smallpox.

The dangers of smallpox were diminished to a considerable extent by the introduction of inoculation in the year 1721. This practice consisted in inserting into the skin of a healthy person by a lancet a small quantity of the matter taken from a smallpox pustule. This in due time produced the same disease, but in an extremely mild form, so as only rarely to cause death. Under favorable circumstances once in five hundred cases. This practice of engrafting or inoculating was of very great benefit to the individuals on whom it was performed, substituting a mild form of disease, with very little danger of death or disfigurement, in place of a very severe and fatal one. But although it was thus of very great value to the individual, it was often the reverse to the community, as it kept the disease constantly alive and spread it broadcast through regions which otherwise might have escaped, and hence diminished little, if at all, the total deaths from smallpox.

In the year 1798, Dr. Edward Jenner published to the world his wonderful discovery of the protective power of vaccination. Many years before, in early youth, he had heard that persons employed in dairy work occasionally became affected with sores on their hands and fingers, which were supposed to have been contracted from the cows, and that such persons were forever protected from the influence of smallpox. Similar occurrences

had been reported to other physicians, and corresponding observations made by them, but they had noted them only as curious phenomena and pursued the subject no further. To Jenner, however, they were more than curious and interesting; they contained promise of a result well worthy of close study and investigation. Narrating the facts to his seniors and teachers in London, he was by them encouraged to pursue the investigation, and afterwards, when settled in practice in an agricultural community, and devoting himself to a physician's work with ardor and enthusiasm, he availed himself of every opportunity to examine the histories of such cases, experimented as to their non-susceptibility to smallpox, and studied the peculiar diseases of the cows. After years of study, meeting at times with difficulties that appeared almost insurmountable, he convinced himself that he had arrived at a firm basis of truth and fact, and published his observations and belief to the world. He had ascertained that cows were liable to several forms of eruption, which might be communicated to the hands of the milkers; that one of these forms produced a peculiar sore on the hands, and that the person thus inoculated was thereafter insusceptible to smallpox—could not be made to take it. He further found that this disease of the cow was similar to and often propagated from a sore occurring on the heels of horses, and that matter from such a source would also protect from smallpox. Jenner believed that the eruption in the cow was smallpox, and named it *variolæ vaccinæ*, and that it produced in the human being smallpox in an extremely modified form, and that this was the reason for the insusceptibility to smallpox afterward. It was so extremely modified and reduced, as it were, to a minimum, that it produced only one small local sore or eruption, had lost its contagious nature and could be conveyed only by direct inoculation.

This was the first step in the discovery of vaccination, but thus far it was of little practical use. The disease was found in the cow only at comparatively rare intervals, and might be easily confounded with some other eruptive diseases, and hence even with all due care and knowledge could only be conveyed to some few fortunate individuals. Jenner's next and most important step was the attempt to transmit the disease from one individual to another, and ascertain whether in such an event it would still retain its protective power. This experiment he tried on May

14th, 1796, which is therefore considered the birthday of vaccination. Matter was taken from a sore accidentally inoculated on the hand of a milkmaid from a cow, and inserted into the arm of a small child. A vesicle and sore similar to the first was produced, and a few weeks after it had healed, smallpox was inoculated and the child was found to be proof against its influence. Jenner repeated the experiment with similar result as occasion offered, and thus established the fact that a simple, safe and efficient protection against, or rather substitute for, smallpox had been discovered.

After the publication of Jenner's book, the progress of vaccination was rapid. It met with some enemies and some opposition, and was injured by the conceit and incomplete knowledge of its friends; but it was so simple in its theory and in its practice, so easily tested as to value, and of such vast promise of benefit to mankind, that it found everywhere intelligent, zealous advocates, who bore down all opposition and spread it to every part of the civilized world.

Dr. Benjamin Waterhouse, Professor of the Theory and Practice of Medicine in Harvard University, Dr. Valentine Seaman, of New York, Dr. S. P. Griffiths, of Philadelphia, and President Jefferson deserve special mention for their active interest in introducing and promoting vaccination in this country. The first vaccinations in the United States were performed by Dr. Waterhouse upon his own children with matter obtained from England, and, the vaccinations being successful, he subsequently, in the most public manner, had them inoculated with smallpox matter in order to display the protective power.

The practice of vaccination having thus spread rapidly through the civilized world, smallpox as rapidly diminished. Dr. Jenner believed that "vaccination, duly and efficiently performed, would protect the constitution from subsequent attacks of small pox as much as that disease itself will," and hoped "that the annihilation of small pox, the most dreadful scourge of the human species, must be the final result of this practice." This belief was well founded, and the hope was not extravagant or unwarranted as far as the nature of the disease was concerned; but it should have required comparatively little knowledge of human nature to dampen the ardor of these expectations. Smallpox was not the only foe to

be fought. It had for allies, ignorance, conceit, carelessness, obstinacy. The very simplicity of the operation proved an obstacle to its due and efficient performance, for everyone who could handle a lancet considered himself at once qualified to operate without implicitly following the master's directions in minor details, and Jenner was constantly occupied in correcting erroneous methods of procedure. Moreover, provision for the future is not the rule in humanity. Absent dangers as well as absent friends are forgotten, and the very diminution of small pox would lead to a neglect of vaccination. Consequently, now, after a period of eighty years, we find smallpox still existing in the world, and, although shorn of its former powers, still yearly demanding its victims.

The practice of vaccination spread rapidly, institutions for the vaccination of the poor being established in the larger cities, and the mortality from smallpox almost at once diminished; from some districts it was entirely absent for years; epidemics became very infrequent. The actual value of vaccination to communities is well shown by a comparison between the death rate before and since its introduction. In England, before vaccination three thousand, and since vaccination two hundred and twenty-one out of every one million of inhabitants have died annually of smallpox. The following figures will show the same results in several other European countries:

COUNTRIES.	DEATH RATE BY SMALL-POX PER 1,000,000 INHABITANTS.	
	Before Vaccination.	After Vaccination.
Lower Austria	2,484	340
Upper Austria	1,421	501
Bohemia	2,174	215
Prussia, eastern portion	3,321	556
Prussia, western portion	2,272	356
Westphalia	2,643	114
Sweden	2,050	158
Berlin	3,422	176
Copenhagen	3,128	286

In this country we have few mortality reports of the last century, and a single comparison must suffice. As before stated, there were epidemics of smallpox in Boston in 1721 and 1752, when the population of the city was about sixteen thousand; in the first the deaths were eight hundred and fifty, or one in every nineteen inhabitants; in the second the deaths were five hundred and forty-four, or one in every twenty-nine inhabitants; in 1872–73 occurred the most severe epidemic for many years, and the deaths were one thousand in a population of two hundred and fifty thousand, or one in every two hundred fifty inhabitants. But it is quite unnecessary to appeal to statistics to show the vast difference in the prevalence of smallpox before and since the discovery of vaccination. Everyone's own individual experience now tells a different story, from the experience of two hundred years ago, when in the words of the eloquent historian, "Smallpox was always present, filling the churchyard with corpses, tormenting with constant fear all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling, at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover." We have all within a few years passed through an epidemic of smallpox, unequalled in severity for half a century, and yet what have we felt and what do we see? Most of us have enjoyed a sense of protection and personal safety, few have lost any of their friends, relatives or immediate social circle. We see on the streets no scarred faces, no sightless eyes. The mortality has fallen almost entirely on those, who from carelessness or prejudice, had neglected vaccination. A few have suffered, notwithstanding a supposed security from this protection but generally have had the disease in only a mild and modified form. The power of vaccination is shown perhaps still more vividly by individual examples in the very presence of smallpox. Dr. Marson, of the London Smallpox Hospital, says: "For just thirty years we have re-vaccinated all the nurses and servants who had not had smallpox on their coming to live at the smallpox hospital, and not one of them has contracted small pox during their stay here." A similar experience has been found among physicians. At a meeting of the Medical Society of London, when about sixty practitioners were present, those

who had taken smallpox after vaccination, were requested to hold up their hands, and of the whole number only four or five were raised. All of them, however, had repeatedly exposed themselves to infection. After a remarkably severe epidemic of smallpox in Milan in 1870–72, it was reported that "of the medical fraternity, including those brought most of all into contact with the disease, but at the same time most safely protected by vaccination, not a single serious example of the affection appeared during the whole period of thirty months."

The writer has frequently vaccinated persons exposed to the contagion of smallpox—persons living in the same house, or even nursing the sick, and has then confidently assured them of complete protection from the disease, and in no instance has such assurance been negatived. The disease has never spread when all those exposed to it were vaccinated.

Jenner believed, as before stated, that vaccination, "duly and efficiently performed," would protect from smallpox as much as an attack of the disease itself, and as second attacks of smallpox were occasionally met with, he expected the same after vaccination. For several years this seemed to be the case, but about 1820 it was noticed that where smallpox prevailed, a certain proportion of the vaccinated were taken sick with a fever and eruption somewhat similar to the original smallpox, but differing from it in certain points, and especially in the very important one of seldom causing disfigurement or death. The disease was called "varioloid," meaning "like small pox." This name, though still used, is unfortunately chosen, as it tends to conceal its real nature. It was really smallpox, "modified" in its course, and rendered mild by the previous vaccination. But though mild itself it was capable of communicating the true smallpox in malignant form to the unprotected. Notwithstanding these cases, the rule of protection by vaccination still held good, and it was only in a comparatively small number that the smallpox afterwards was seen. Jenner believed that in all these cases there was some want of care in the original vaccination, or that the vaccine vesicle had not gone through its course in a perfectly normal manner. And this opinion was undoubtedly correct in the majority of instances, and the imperfect scar on the arm often demonstrated the imperfection of the original process.

The power of vaccination is shown almost as much in this modifying influence as in its protective powers. In the London Smallpox Hospital, two thousand six hundred and fifty-four unvaccinated patients were admitted, of whom nine hundred and ninety-six, or 37 per cent. died, while of four thousand eight hundred and ninety-six vaccinated patients only four hundred and two, or 8 per cent. died. Of sixty-one cases occurring under the observation of the writer in 1872, thirty-one had not been vaccinated, of whom eighteen, or 58 per cent. died, while of thirty vaccinated only one died.

When these instances of varioloid or post vaccinal smallpox became numerous, the question was asked whether the protective influence became exhausted in the system after a certain period of years, or whether the vaccine virus had degenerated by passing through a number of individuals and becoming humanized. That the former is correct is now generally acknowledged to be true, and it has been found that the period of life during which the protective power suffers most loss is the period of growth from childhood to adult age, and it is also found that an efficient revaccination at this period will renew and complete the protection for life. This is the opinion of those who have had the largest experience with smallpox. Dr. Marson writes, "very few patients have been admitted with smallpox into the hospital who stated that they had been revaccinated with effect." Dr. Grieve, Medical Superintendent of Hampstead Smallpox Hospital, says that out of six thousand two hundred and twenty-one cases admitted, in only three could any satisfactory proof of revaccination be discovered. He expresses his conviction that *revaccination is a sure protection against smallpox*, and that cases of small pox subsequent to revaccination are merely the exceptions that prove the rule; they are more uncommon than second small pox. The physicians of the Dublin hospitals after the epidemic of 1872 reported the same experience and expressed themselves to the same effect.

With regard to the second question, whether the vaccine virus has degenerated by transmission through a long succession of human beings, medical opinion is not unanimous. That it may and frequently does degenerate is undoubted, but that it necessarily does so is not sustained by facts.

Jenner wrote: "The matter may undergo a change that may

render it unfit for further use, by passing even from one individual to another, and this was as likely to happen in the first year of vaccination as in the twentieth. * * I vaccinate here weekly, and the vesicles are in every respect as perfect and correct in size, shape, color, state of the lymph, the period of the appearance and disappearance of the areola, its tint, and finally the compact texture of the scab, as they were in the first year of vaccination; and to the best of my knowledge, the matter from which they are derived was that taken from a cow about sixteen years ago."

Dr. Marson, while admitting the frequent degeneration of humanized virus, and advising an occasional return to the cow, says "we have frequently produced, lately, with lymph brought into use by Jenner more than fifty years since, vaccine vesicles which on comparison, exactly correspond with vesicles sketched in Jenner's original work explaining and illustrating the vaccine disease."

The practical rule for the physicians will be to use virus that is proved good by producing typical vesicles, pursuing their course regularly and leaving behind well marked cicatrices, but as soon as there is any inferiority in the vesicle or any irregularity in its course or cicatrix to abandon it and seek a new stock from animal virus, which now fortunately can easily be obtained.

When vaccine lymph is introduced by puncture beneath the skin the following appearances present themselves: For the first two days no particular effect is noticeable, by the third day a slight pustular elevation is perceptible; and this by the fifth or sixth day has become a distinct vesicle of a bluish-white color, with a raised edge and a peculiar central cup-like depression. This gradually enlarges and by the eighth day has attained its highest perfection. It is then plump, round, more decidedly pearl colored, it is distended with clear lymph and the elevation of the margin and the depression of its centre are more marked. At this date, or sometimes a few hours earlier, a ring of inflammation termed the areola begins to form around its base, and the vesicle and areola together continue to spread for the next two days. The areola is circular and has a diameter of from one to two inches; it is often attended with considerable hardness and swelling of the subjacent cellular tissue. The areola is the occular evidence that the vaccination has produced its

specific effect upon the constitution. Generally at this period the constitution shows sympathy with the local disease; there is slight feverishness, restlessness and heat of skin with some derangement of the stomach and bowels, though these symptoms are sometimes very slight. After the tenth day, the areola begins to fade, the vesicle begins to dry in the centre and by the fifteenth day a hard, dry, brown scab is formed. This scab generally contracts, hardens, dries, and falls off about the twenty-fifth day, leaving a cicatrix which is commonly permanent, and which in character is circular, somewhat depressed, foveated, or indented with minute pits and sometimes radiated.

When the vaccination is done by abrasion and not by puncture, it may develope as above, if of small size, or if larger, two or three vesicles may rise, which will coalesce into one large one, either circular, or oval or other irregular shape. This represents the normal course of a primary vaccination; it may be accelerated or retarded for a few days, but any other variation should be regarded as modifying its protective power, and rendering it doubtful.

The vesicle of a revaccination does not follow exactly the same course; generally it runs its course more rapidly, the vesicle being small and the areola formed on the fourth or fifth day. The axilliary glands are generally affected, and there may be considerable headache, nausea, malaise for one day at least. Occasionally the vesicle follows precisely both in form and progress the course of that of a primary vaccination.

After the vaccination sore has passed through this normal course, the subject cannot be made to take smallpox either by inoculation or contagion, but it is sometimes important to know at what precise period this immunity occurs, as in cases where persons who may have been exposed to smallpox contagion request to be vaccinated, or ask what assurance can be given them of protection by vaccination. As a rule of practice it is well to vaccinate at any period after exposure until symptoms of the disease actually set in, because infection does not always occur with the first exposure, and there is no certainty as to when it has actually occurred. After vaccination the mark of protection is the formation of areola. The vesicle may be perfect and still smallpox ensue in severe form, as the writer has seen on more than one occasion, but if the areola be formed without the appearance of any symp-

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toms of smallpox, the subject is then secure. "When small pox has been taken into the system there is twelve days freedom from illness generally, forty-eight hours illness and then the eruption begins to appear on the skin. The areola of vaccination is not fully formed until the ninth or tenth day of the progress of the vesicle, so that unless there has been time for the areola to be formed after the vaccination before the illness produced by small pox begins, the vaccination will not be of the least benefit." In other words, if a person be exposed to the small pox contagion, the first symptoms of the disease would appear in twelve days; vaccination requires a period of ten days to protect, therefore if a person be vaccinated within forty-eight hours after exposure the protection will be effective; if vaccinated within the subsequent twenty-four hours, the areola will have commenced to form before the illness of small pox begins and the disease will be modified; vaccination done subsequent to this period will be of no avail whatever. Dr. Marson says, "this we have seen over and over again, and know it to be the exact state of the question." As the revaccination vesicle generally developes in a shorter period than the original, revaccination performed even four days after exposure to contagion may prevent the development of the disease.

In order that vaccination may confer its full protective power, it must, as Jenner said, "be duly and efficiently performed." Unfortunately the method appears so simple that many medical men neglect the study of the essentials of success, and nurses and mothers, who have never heard of them, attempt to imitate the example of their physician. And it is undoubtedly to this carelessness and consequent bad vaccination, that so much post vaccinal smallpox has been due.

The operation of vaccination includes three considerations:

First. The selection of the virus.

Second. The method of operation.

Third. The condition of the person to be operated on.

1st. The selection of the virus.—The vaccine virus consists of the lymph or crust taken from the vaccine vesicle on either a human subject or a cow. The former is used in a large majority of cases. It should be taken only from a first vaccination of a healthy, strong infant—healthy both in general appearance and on special investigation as to any possible constitutional disease.

It should never be taken from adults or from a *re*-vaccination sore. The former, on account of a greater likelihood to such disease; and the latter, because the protective power is much less, or may even be wanting, as in the following instance given in the Report of the New York Board of Health for 1871: "A mother obtained matter from a healthy *re*-vaccination vesicle on the arm of a friend at the eighth day. She vaccinated her four children, none of whom had ever been previously vaccinated, with this virus; the vaccination was, to all appearance, successful in each case, full, healthy-looking vesicles, maturing on the eighth day. Almost a month afterwards all four children were stricken with the smallpox."

A physician should, under no circumstances, make use of inferior vesicles, but use the utmost care in selecting from only the very best subjects; just as a gardener prefers the seeds from the best specimens of his plants. When the stock deteriorates or fails, or if he or his patients have such a preference, he should resort to the animal vaccine, an excellent supply of which is now kept in market. It is not necessary to discuss which lymph is preferable, or if there is any general preference of one to the other. Either, *when good*, will effectually protect, and is entirely devoid of danger. Human lymph must, for a long time, be the one chiefly used, still it is apt to deteriorate, and is, on rare occasions, subject to a danger from which animal virus is free. The animal virus has hitherto been carefully propagated and worthy of confidence, but as the demand for it is increasing, and it is becoming an object of trafic, there is a very great probability that much will be offered for sale entirely unworthy of confidence, inert or even injurious.

As soon as the vesicle forms, the lymph is fit to use, and on the fifth day it is particularly active. The quantity is small, however, and it is better to wait till the eighth day, when the vesicle is full. This is usually, however, the last day on which it should be taken, as afterwards, when the areola has commenced to form, it is far less successful. Jenner laid it down as a "golden rule," never to take lymph for vaccination after the formation of the areola. He found that such lymph was not only less active, but that even when it did produce a regular cow pox, it frequently failed to protect the system from small pox. Lymph is taken by pricking the vesicle in one or more

points with the point of a lancet, or a needle. A few drops of lymph will exude from each puncture, which may be used while fluid by inserting into the arm of another child, or applying to an abraded surface. This arm-to-arm method is the best possible, and is most uniformly successful, but unfortunately can only be applied in vaccinating institutions, in families where there are several members to be vaccinated, and in a few other instances. Generally the lymph must be preserved for a longer or shorter time, and carried to the person to be vaccinated. It may be taken on the point of the vaccinating lancet, and dried there; but the usual method is to collect the exuded lymph on the surface of a quill or ivory point and allow it to dry. These points should then be carefully wrapped up, and kept away from the atmosphere. Another method is by the use of capillary glass tubes; a drop of the virus may be collected in such a tube, the ends of which are then closed by sealing wax, or by melting them in an alcohol lamp; only enough for a single vaccination should be put in each tube. The lymph thus excluded from the air will remain liquid for months and years, retaining its activity, and may be used in the same manner as fresh lymph by breaking off both ends of the tube and blowing it out on the point of a lancet or a piece of glass. Not more than half a dozen quills or tubes should usually be collected from one vesicle. No pressure should be used to make the lymph exude, and if the slighest tinge of blood is visible in the lymph, it must not be taken.

The crust or scab formed by the drying of the vesicle, separates from the cicatrix about the twenty-fifth day. It was first recommended for vaccination purposes by Mr. James Bryce, of Edinburgh. He described its formation as from the early and active lymph of the vesicle, the drying process beginning as early as the fifth or sixth day in the centre. He recommended it as being equal in power to the most active lymph, as affording a more abundant supply, and as being able to be kept for a longer period, and obtained more easily. This form of virus has been much used in this country, on account of the advantages above enumerated, especially the facility of obtaining and preserving it in town and country practice where there are no public institutions to depend upon. It is also extremely active in its power, and gives

more success than any other method, except the arm to arm method. It is a valuable supply in times of small pox epidemics, when a large quantity is virus is required, for while a vesicle will only charge five or six quills, a good crust will vaccinate twenty or thirty, or even more persons. The same care must be used in selecting crusts as in selecting lymph, and they must be taken only from excellent vesicles which have gone through the regular course in children known to be healthy. Mr. Bryce thus describes the character of the proper crust: "It is those crusts only which can be ascertained to have been formed from the vesicle after it has run through a regular course, and which, when separated from the part, are found, on examining them by a strong light, to be nearly transparent, which I would recommend ever to be used." Dr. J. P. Loines, of New York, described the crust as composed by a drying and purifying process, so as "to leave the lymph almost by itself, hardened, amber-colored, semi-crystaline, diaphanous and covered by the hardened cuticle which varies in color according to the surrounding skin, the product falling off in the shape of a very thick, roundish, countersunk scab. Its thickness should be about one-third of its large diameter. It is probably the thickest and heaviest scab produced upon the human body."

2d. The method of operation.—If fluid lymph be used, whether from arm to arm, or from capillary tubes, the point of the lancet should be dipped into the lymph and inserted by a puncture beneath the epidermis; a drop of blood may follow, but this will not often wash away the virus. Or instead of this method, a series of transverse scratches may be made, or a small portion of the epidermis abraded by a lancet—a dull lancet being preferable—or by the vaccinator, made of short needles, like a rake. In either case a surface should be exposed or cut across, equal in size to a split pea, and the lymph rubbed on with the flat side of the lancet; it is an excellent plan to rub the lymph first on the surface of the skin and then scratch through this, and afterwards apply lymph a second time. If the dried lymph on quills, or the crust is used, the skin is to be scratched or abraded in the same manner, the quill to be dipped in luke-warm water so as to soften the lymph, and then rubbed for a minute on the abraded surface. If the crust be used, it is to be pulverized by

crushing between two pieces of glass, then moistened with water and rubbed up until a sort of emulsion is made, and this is then applied by the flat side of a lancet. No more should be mixed than sufficient for the operations proposed, and if any remain it should be thrown away, and under no circumstances should it be laid aside for a subsequent occasion. After being mixed with water it rapidly decomposes, and becomes either inert or positively injurious. Occasionally a small piece of crust is inserted beneath the skin by a puncture, or the powdered crust by a vaccinator, made of a hollow needle with a piston. The writer has never seen this method used, but it is said to be very successful. Whatever method be used, it is of strict importance that the lancet or instrument used should be perfectly clean. A minute quantity of blood is usually drawn, and there is more danger from this source than almost any other. The lancet, therefore, should be dipped in hot water and wiped after each operation, or when practicable it should be cleansed by passing through the flame of an alcohol lamp.

Jenner thought that the formation of one single vesicle was sufficient to afford entire protection, and so it undoubtedly is in the majority of cases. There is reason to believe, however, that the protective power does to some extent depend upon the amount of the local affection, and consequently many physicians prefer to make numerous vesicles. It has not been shown that the number of the vesicles affects the *liability* to the disease, but Mr. Marson has shown from the large experience of the London Small Pox Hospital, that the severity of post-vaccinal small pox does have a direct relation to the number and quality of the vesicles. He found the mortality proportioned inversely to the number of vaccine scars. The mortality among those having one vaccine cicatrix only was 7.73 per cent., of those having three or more, was 1.22 per cent. Among those having *well-marked* cicatrices the mortality was 2.52 per cent.; among those having badly marked cicatrices, 8.82 per cent.

Dr. Marson's own practice was to vaccinate from arm to arm by puncture, and to make six punctures about half an inch or less apart from each other. When vaccination is done by abrasion the vesicles will be much larger, being a compound vesicle formed by the coalescing of several small ones. It would appear rational that there should be no difference between the effect of one large

vesicle of this nature, and that of several small vesicles, and therefore the area of cicatrices is of importance rather than the number of cicatrices. Dr. Loines recommended the formation of a cicatricial surface equal to the area of a circle three-quarters of an inch in diameter. The small vesicles have an advantage over the large one in that they are less liable to be ruptured.

The vaccination process should be seen by the physician as frequently as possible, and at least about the seventh and tenth days, and also when the scab has separated.

In the presence of small pox, that is where a person may have already been exposed to the contagion of small pox, it is advisable to vaccinate in at least two places, so as to give additional surety of success. If one point should not "take" the other may, and immediate success is absolutely necessary and no chance of failure can be allowed.

3d. The condition of the person to be vaccinated.—In the presence of small pox every unprotected person should be at once vaccinated, but in ordinary circumstances there are several conditions to be considered. Healthy infants may be vaccinated within a few weeks after birth, and the operation should, if possible, be done before teething; the third and fourth months are perhaps the best time. If done while the teeth are coming through the gums, convulsions occasionally are induced from this double irritation, and under these circumstances they are always attributed by the parents to the vaccination. If a child is at all sick, or weakly, it is well to defer the vaccination until recovery; this is advisable especially where there is any cutaneous eruption, as these frequently modify the course of the vesicle, and in the opinion of Jenner often interfered with the protective power; even a slight eczema behind the ears should be healed before performing vaccination. The Spring and Autumn are the best seasons for vaccinating, and it should be avoided during Summer as much as possible, partly because infants are more liable to sickness at this season, and also because during the hot weather the children are more apt to scratch and break the vesicles. Vaccination should never be performed if there is a case of erysipelas in the house, or if the disease be prevailing in the vicinity.

Revaccination should be performed under the same conditions as vaccination, except of course as to age. All persons should

be revaccinated between fifteen and twenty years of age, and if the operation be unsuccessful it should be repeated at occasional intervals until success be obtained. Failure of the revaccination is not absolute proof of the continuance of the protection of the first vaccination. The rule is that no adult can be *assured* of protection against smallpox until he has undergone a successful revaccination.

When properly performed, vaccination is almost uniformly a perfectly safe and trifling operation. Still in a few instances it has been followed by serious consequences, and both the frequency and severity of these have been so greatly exaggerated as to give rise to a certain prejudice against its employment. The objections urged against it are—

First—The immediate danger from the operation.

Second—The introduction into the system of some constitutional disease together with the vaccination.

1st. The immediate danger consists in the occurrence of unhealthy inflammation and ulceration, or of erysipelas starting from the vesicle. The former occasionally occurs, but almost never when good fresh virus is used, and any tendency to inflammation can be arrested by rest and soothing applications. Erysipelas may supervene after vaccination, just as after any scratch or wound, and it is the scratch and not the vaccine process that causes it. As erysipelas in young infants is a serious, and sometimes fatal disease, such cases are fortunately rare, and generally may be attributed to the constitution of the child or exposure to the contagion of the disease. They are often seen when erysipelas is prevailing as an epidemic.

2d. The fear of inoculating some other disease is the chief danger in the eyes of the parents, who are not less desirous than the physician that the matter should be taken from a good healthy child. They fear lest a feeble child should graft its own feeble constitution, or a sickly child, a tendency to scrofula and cutaneous eruptions.

It has been demonstrated to the satisfaction of all physicians that there is no possibility of such infection, but scrofula and cutaneous eruptions are extremely common affections, and when they make their appearance subsequent to vaccination, it is natural that parents should rather accuse the vaccination, than the natural constitution of their children.

The charge of inoculating other disease unfortunately cannot be entirely denied, and that, too, in the case of one of the most serious infections—syphilis—but even here vaccination in the large majority of cases has been unjustly accused. All post-vaccinal syphilis is not the result of the vaccination, and the order of their occurrence on the skin is not the order in which they were acquired; and yet here more than in all other cases the parents would prefer to accuse the vaccination.

A few cases have occurred, however, which admit of no other conclusion than that syphilitic poison was conveyed with the vaccine. Such cases, however, are extremely rare. The majority of physicians, of the highest repute and largest experience in the treatment of both classes of cases, vaccination and syphilis, have never met such instances. There is reason to believe that where syphilis has been so transmitted, it has been due to a want of proper care in taking the lymph, which instead of being pure has been mixed with blood. Whether syphilis can be conveyed by pure vaccine virus is not yet absolutely determined. But it certainly can be conveyed by blood, and it is extremely probable that in all the reported cases, it was so conveyed by a few drops of blood effused into the lymph by careless handling, and then taken up on the lancet or quill. The danger of this infection is so slight that it really is no objection to vaccination, but only an additional incitement to the physician to use the utmost care in selecting and collecting the lymph, and to be certain of the cleanliness of his lancet before operating. If doubt, fear or prejudice still continue on the part of physician or patient, a resort to animal vaccine virus will do away with all difficulties.

Since the annihilation of smallpox is of such great importance to the community, it may be proper to consider here whether the State government can or should in any way exert its authority and influence to confer the protection of an efficient vaccination upon all its citizens. The State has certainly the right to require, in the interest of public health, that every person should be vaccinated, and it is no unwarrantable interference with personal liberty to take away the liberty of conveying to others a loathsome and fatal disease; but before enforcing this right it should first give them assurance of a safe and efficient vaccination. Such assurance it cannot give at present, for the

operation requires medical knowledge and skill, and the State exercises no supervision over the practice of medicine. It is manifestly improper to require its citizens to submit themselves to a medical or surgical operation until it undertakes to provide skillful physicians and surgeons. Moreover, if a law should be enacted, requiring the vaccination of all infants, as is the case in England and some other European countries, it would be impracticable of enforcement without a more extended machinery of police and oversight of individuals than we now have, and it would stand consequently as a dead letter on the statute book.

But if it is inexpedient to use authority, the State may use a certain influence by offering facilities for vaccination. This influence it might exert in two ways: by establishing a corps of public vaccinators, and by providing a constant and reliable supply of vaccine virus.

Skillful physicians should be appointed as public vaccinators for every city and township, whose duty it should be to keep the public advised, by circulars and advertisements at stated intervals, of the benefits and necessity of vaccination, and to vaccinate gratuitously all who might desire vaccination. This plan could scarcely be carried out at present, as the State has no method of exercising such control over these communities, but when a general law shall be enacted (at no distant day, we hope) establishing local boards of health in every city and township, such a provision can easily be made.

Meanwhile a great deal of good might be done by the supply of efficient and reliable vaccine virus. The expense would not be great and the benefit would be conferred directly upon every person or family in the State. Individual physicians find great difficulty in keeping on hand a constant supply of vaccine, and they are thus tempted to use an inferior quality. A constant supply of the best human vaccine virus can only be kept up in vaccination institutions of large cities, where there are a large number of infants to vaccinate, and during epidemics of small-pox it is difficult to fill the demand. This difficulty and the fear of the possibility of syphilitic contamination has caused a demand recently for animal virus. At first it was supplied mainly by two or three physicians, whose names were a guarantee of its value. Recently it has been placed on the market and advertised by a number of druggists, from various sources,

and as the demand increases there is every probability that matter of an inferior quality will be offered for sale.

Animal vaccination requires as much care and skill as human vaccination, and should be conducted only by the same thoroughly qualified professional men, and it is of the utmost importance that the supply of virus should not be left to the ordinary competition of trade. There would seem to be a particular propriety in placing the procedure under official inspection or direction, and the establishment of vaccine farms by State Boards of Health would undoubtedly contribute very greatly to the efficient vaccination of the people. Vaccine virus could be distributed gratuitously or at small expense and with an assurance of perfect safety and protective power. Moreover in times of epidemic smallpox, the value of such an institution would be inestimable. At such times the demand for vaccine increases enormously and suddenly. The unvaccinated children are all brought at once, and under this alarm the demand for revaccination now first appears, and the supply of "matter" is soon exhausted. However with an animal vaccine institution this difficulty disappears. A few more heifers are procured, which may each be vaccinated in fifty places if necessary, and in a week's time enough virus obtained to supply the wants of any ordinary city.

ABSTRACTS FROM ADDRESSES AND PAPERS BEFORE THE NEW JERSEY SANITARY ASSOCIATION.

BY E. M. HUNT, M. D.

The first meeting was held at Newark, N. J., October 13th, 1875, and was opened with an address by the President, Dr. S. H. Pennington.

He spoke of the necessity of more attention to sanitary matters in this State, and of the need of the co-operation of the people. Human life is in constant peril from deleterious agencies at work within, beneath and around us. Telluric and meteoric emanations and influences, often in localities where they are least suspected, are diffusing themselves through the atmosphere depressing our vital forces, weakening our power of resistance to other pernicious agencies or directly prostrating us with malarious maladies. It is difficult to believe that the fearful waste of human life is due to a defective organization imposed by the Creator. We are compelled to attribute it to causes incident to civilization or called into action by neglect and preventible by the precautionary and corrective agencies that careful investigation and scientific skill may bring to our assistance. Some of the manufactured causes of disease are peculiar to cities—but the country hamlet, even the solitary farmhouse—is not without its perils. The barnyard, the sheepfold, the pig-sty, the unremoved garbage, the compost heap, the cesspool, the privy, the well, the stagnant pool, the pestilential marsh or the neglected mill-pond, will frequently explain the origin of malignant diseases which the sufferer and his neighbors may piously attribute to a mysterious visitation of Providence. Some of the obvious remedies are familiar to you. They

are found in through ventilation and ablution, in the bountiful supply of pure water beyond the reach of cesspools, privies and animal or vegetable deposits; more perfect systems of drainage and sewerage, more efficient police to prevent the sale of adulterated milk and other aliments consumed by our people; to compel the removal of nuisances, not only from streets, but from the premises of citizens; to superintend the construction of buildings; to forbid the overcrowding of the tenements occupied by the poor; to suppress the resorts of intemperance and impurity, whose frequenters are generally among the first victims of epidemic disease; and what is of quite as much importance as any of these, the diffusion of correct principles of hygiene among the people in town and in country and in the institution of scientific commissions to collect and collate facts, and to ascertain the laws governing malaria and miasm, and the most effectual means to counteract and neutralize them.

Dr. Pennington also put in a plea for sanitary attention to animals, and for a closer study of the causes of the diseases to which they too are unnecessarily subjected.

Professor A. R. Leeds discussed the water supply of Newark, Jersey City and Hoboken. He had made analysis of the waters of the Passaic and thought that its impurities had been somewhat magnified.

Dr. Ryerson, of Boonton, thought that the undrained land and swamps along its course added much to its impurity.

Dr. S. B. Hunt read a paper on "atmospheric humidity, in relation to sewage and drainage." The paper showed how largely certain atmospheric conditions influenced the evil effects of sewage and promote disease.

General E. F. Viele read an extended paper on drainage, sewerage and water supply. He carefully distinguished between sewerage and drainage, giving reasons and arguments why they must be kept distinct in practice as they are in fact. The vast amount of poisonous matter discharged into sewers was stated. Unless a sewer is rightly constructed, has a proper descent and is thoroughly flooded it is a public nuisance—a retort from which poisonous gases are thrust into houses through wash basins, water closets and bath tubs. Ventilation of sewers so much ignored in the country must be secured. He suggested

that ventilating tubes be placed in the lamp-posts. There should be also a trap between the soil pipe and the sewer.

General Viele then treated of *Water Supply*, describing the proper source of supply, the proper reservoir, both as to masonry and size. With a large map he illustrated the Passaic river with the large areas of saturated soil bordering on it, and its city soils saturated with still more dangerous organic matters. The water supply for all the cities should be obtained from the mountain streams which drain the counties of Passaic, Morris and Bergen, in New Jersey, and Rockland and Orange counties in New York State. When united they form the Passaic river and drain an area of seven hundred and fifty square miles above Little Falls, and this would supply ten million eight hundred thousand inhabitants. There is ample room below Little Falls for a collecting basin, without any interference with the contemplated removal of the existing obstructions in the river. Near this basin there is on the east side of the first mountain a depression which almost seems formed for a great receiving reservoir, inclosing a valley about five hundred acres in extent, the bottom of which is three hundred and thirty-nine feet above tide-water, the outer rim being four hundred and seventy-two feet above tide-water. From this great reservoir or aqueduct can be constructed distributing reservoirs, so that all the cities from Elizabeth to New York could be supplied. Co-operation in this plan was urged upon all the great cities of New Jersey east of the mountains.

The paper was discussed by Prof. Leeds, Prof. Cook, Dr. E. M. Hunt, and others. Prof. Cook, by request, described the course of the Passaic in its variableness of flow. He noted where impurities entered the water, and where supplies of clear water were received. He thought that the future probable water supply of Newark, Jersey City, Elizabeth, etc., must come from the mountains west and north. The hydrant water is impure. He would prefer General Viele's plan of bringing water from Little Falls, if it were not for the long level back of that place, where the water which flows along is filled with impurities. He thought the better plan was to construct reservoirs beyond the level and bring the water over the mountain.

Dr. F. Gauntt, of Burlington, offered a paper on the sanitary condition and types of disease of Burlington and vicinity. He

claimed that miasmatic disease was the natural result of civilization, especially as men congregated near cities were disposed to interfere with water-courses by dams, wharves, etc. Not only were wet places not drained, but the drainage of nature was interrupted. Malarial fevers had prevailed extensively in his own region. More recently a notable illustration had occurred in one section of the value of efficient legislation. A remedy was found through a bill which gave power to commissioners to go upon the drowned lands and make ditches, sluices and drains. The effect is wonderful. $6,000 expended in this way has during the last four years increased the value of our property, and we are enjoying much better health by comparative freedom from malarious disease. It is interesting to know also that about the same time a freshet broke away the dam of the Assiskunk creek and allowed the tide to flow in its own channel. The usual chills and fever now no longer exists along its borders, while before every person within a mile of it was sure of its pernicious influence.

Mr J. R. Shotwell, of Rahway, read a paper descriptive of the effects of the removal of mill-dams in Rahway, which showed what a great diminution of malarial fevers resulted from the change.

The second annual meeting of the association was held September 28th and 29th, 1876, in the chapel of Rutgers College. The session opened with an address by the President, Prof. Geo. H. Cook, Ph. D. The following is a brief outline of the address:

The work of this association is less exciting but not less important than that of the physician, and is well worthy of the attention of every philanthropist. The statistics of Geneva, London and the British Navy show the following ranges:

Geneva, sixteenth century, forty deaths per one thousand; eighteenth century, thirty deaths per one thousand; nineteenth century, twenty-two deaths per one thousand. London, in 1750, thirty-one deaths per one thousand; 1838, twenty-eight deaths per one thousand; 1873, twenty-three deaths per one thousand. The British Navy in 1770 averaged one hundred deaths per one thousand, and in 1840 ten deaths per one thousand.

Other comparisons were made which, although only approximate, showed that the tendency of hygienic measures is to pro-

long the average period of human life. We recently have been shocked at the Bulgarian atrocities—twelve thousand people. having been massacred in cold blood by the Turks; but we have coolly stood by during the past year while, within fifty miles of us, nearly as many and valuable lives have been lost from causes which certainly might have been removed.

Prof. Cook then noticed some of the means by which the death rate had been diminished. Through preventive methods small pox had been greatly diminished. He contrasted its ravages from neglect in our country in some parts, with the deliverance which in other parts results from careful vaccination. Small pox, so common in Ireland, was so much limited by vaccination that in 1863 it was made compulsory. The following statistics are not without their significance:

From 1830 to 1840 the annual mortality from small pox was five thousand eight hundred; 1840 to 1850, three thousand eight hundred and twenty-seven; 1850 to 1860, one thousand two hundred and seventy-two; 1864, eight hundred and fifty-four; 1865, three hundred and forty-seven; 1866, one hundred and eighty-seven; 1867, twenty; 1868, nineteen.

In Copenhagen, after several previous years of compulsory vaccination, there were thirteen consecutive years without one death from smallpox.

The change made in New York and London by the reconstruction of low and filthy districts of those cities was then noticed. The plague had visited London about every twelve years, and in a single century had numbered over one hundred and fifty thousand victims. Although the infection has been frequently brought to London, it has been watched and guarded so that since 1665 it has never gained foothold.

The *collection of vital statistics* was urged, because it would show in time, by hard figures, the causes and courses of disease. Allusion was next made to the importance of providing wholesome drinking water for all.

Many samples of well water have been examined by us which show that the impurity alleged to exist in many well waters is not exaggerated.

Cases near Camden were cited to show how Kensington water had produced diarrhœal diseases. The Professor closed by showing how the average of life could be brought much higher

by sanitary measures instead of being, as it now is, only a little over thirty-five.

The report of the Committee on State Water Supply was made through its Chairman, Professor A. R. Leeds, of Stevens' Institute, Hoboken. Allusion is first made to the several distinct water basins into which the State is divided by the natural lines of demarcation between its water sheds. The character of these water basins needs to be determined:

1. By an accurate hydrographical map upon the basis of a topographical survey.

2. The determination of the rain fall for each water basin, and the number of gallons of water flowing into its several water courses monthly.

3. An examination of the quality of water in each basin.

4. An inquiry into and a tabulated statement of the amount and character of the solution exisiting at present in the water courses of the State. Under this:

(*a*.) The drainage of sewerage along the banks.

(*b*.) Manufacturing statistics, relating to the subject and the proper disposal of contaminatig refuse. Without attempting to discuss or settle these the paper discussed *whether any particular* community has a natural right to the use of the water supply of the water basin in which such community is located in an *uncontaminated condition*. This right is vindicated. The next point is to arrive at a decision "whether a stream, after pollution, can by flowing a limited number of miles in contact with air and growing plants be again made safe drinking water." The report notices the contradictory views of high authorities and shows that in many cases the addition of pollutions does not show contamination down the stream or sickness resulting therefrom. The Passaic river, in New Jersey, and the Blackstone, in Massachusetts, are cited as showing that rivers do have powers of self-purification. Yet this is not always the case and the pollution of the streams which supply water to large cities is an important sanitary question for investigation.

Another inquiry is whether any means, microscopic, chemical or otherwise, exist to discriminate infected and non-infected sewage and if they can be distinguished? The question is not answered.

If sewage and other impurities are permitted to go into a water

supply how much and what kinds are permissable without detriment to health. The report inclines strongly against the pollution of streams, especially those having their exit amid very large cities and insists that Newark, Jersey City, Hoboken, etc., have occasion for earnest study of this subject. It is also urged that there be close study of disease or ill health as related to polluted water supply.

Dr. J. W. Pinkham, of Montclair, followed with a paper on "Wells and House Supply of Water." The evils possible to water in wells and cisterns were briefly noticed. All enrichment of soil by organic matter, and by natural decay or contamination by sewage, by privy vaults, by decaying animals behind stone walls, or from other sources endangers the water supply. We suffer more in low water than when the well is full, since much of the debris finds its way to the bottom and is not uniformly distributed in solution.

How shall a well be constructed so as to avoid or materially decrease the chances of introduction of foreign matter? First, the well above low water should be made of material impervious to water or by omitting part of the wall altogether. The design of this is that it may not act as a drain for the neighboring soil. The wall of the well may be framed from a point two or three feet from the bottom, made of brick with a coating of hydraulic cement.

The earth around should be thoroughly packed so as to prevent the entry of surface waste. To prevent foreign matter getting into the well, you may place a feed pipe in position, arch over the well, and fill the remainder down to high water with earth.

Dr. Pinkham contends that the prevalent notion that a well must be ventilated is not true. The only noxious gases in a well result from the decay of organic matter, which has found its way into the well.

CISTERNS.

Rain water, when collected in cisterns, is liable to contamination from the dust and filth, which collect on roofs and in gutters, or from whatever may get into the cistern besides pure water. The leaders communicating with the cistern should have a shut-

off, so that the water from the roof can be momentarily cut off if desired.

Every cistern should also be provided with a filter. A brick partition modeled in a circular form makes a very good filter. The partition should be carefully built of bricks laid up in cement in such a way that there are no apertures between them. The filter, however, can be made of charcoal, sand or gravel. The cistern, as before, should have a circular partition, but with its convexity toward the smaller compartment, which contains the filter. The first layer of bricks should be laid with space between them. The filter may be made thus: Place in the bottom of this smaller compartment a foot or eighteen inches of charcoal, of pieces about the size of nut coal. Upon this place six inches of ordinary gravel, then six inches of sand, then a foot of coarse gravel. Water passing through is freed of impurities, but this filter will need occasional cleansing. The sand and gravel can be washed and the charcoal by washing and heating in an oven, may be used again.

Cistern water frequently becomes saturated with sewer gas from the cess-pool or sewer. This may occur either from too close proximity or from a connection of the overflow pipe with a sewer pipe. The overflow pipe should either discharge on the ground or into a drain which conveys water only.

G. S. Page, Esq., of Morris county, read a paper descriptive of the head waters of the Passaic river, with especial reference to the great morass of several thousand acres a few miles below its source. Mr. Page advocated a dam twenty-six feet high in Long Hill Gorge, below the swamp, by which its nine thousand acres could be covered to an average depth of twelve feet. This would make the level two hundred feet deep above tide water and Newark, Orange, Elizabeth, Jersey City and Hoboken could have an abundant water supply by gravitation. The plan was regarded as feasible by Engineer Ward, of Jersey City, and Professor Cook, if beside a second reservoir be added below.

VITAL STATISTICS.

Dr. J. L. Bodine, of Trenton, then read a Paper on Vital Statistics. The paper claimed that sanitary science is essentially a science of observation, founded on statistics. It must use the

numerical method of observation, a method widely open to fallacious conclusions, but when rightly used, the basis of all sanitary reform. The past history of disease as shown by statistical returns proves that some epidemic diseases have ceased upon the surrender of the habits of life and the avoidance of the causes which gave rise to them, that others have been diminished and the average of life prolonged.

The researches of Drs. Bowditch and Buchanan as to soil moisture in its relation to pulmonary diseases and of Dr. Snow as to drinking water in its relation to cholera were adduced as instances of the triumph of the statistical method. Its advantages in Great Britain and on the Continent are no longer questioned. The defects in our present State law were then rehearsed and evidence furnished by Dr. Bodine, Dr. Hunt and others, as to the incompleteness and inaccuracy of the returns.

SEWERAGE.

The next paper was by Ashbel Welch, C. E., of Lambertville, on Sewerage. He first raised the question whether animal excrement should not be removed in the same way that animal and vegetable offals are removed. We must not shut our eyes to the fact that sewers are themselves great evils and if imperfectly constructed or badly managed may cause worse diseases than they prevent. The sewer may easily become an extended generator of poisonous and sometimes of deadly gases. The dry air above ground has the chance to dilute and dissipate poison, but the moist air of the sewer is a deadly carrier. Modern improvements are especially convenient for carrying it into the bed-rooms of houses. As many of these noxious gases are lighter than air they ascend to high rooms and to elevations which would otherwise escape. Not only do these noxious gases produce general ill-health or disease, but they also convey some specific poisons and probably originate others. They make many a sporadic disease epidemic. House pipes should therefore not have too close connections with the main sewers. Allusion was made to the poison from sewer gas in a Washington hotel, to diseases which had occurred in Glasgow in houses on elevations since house conveniences had been introduced, and to evils which had been incidental to sewers in Croyden, England, and

in Berlin. Mr. Welch declared bath-tubs, water closets and stationery wash-bowls as now scattered through houses, intense evils. Water traps are unreliable because the water is often blown or sucked out by the pressure of foul gases or the poisons pass through it by being absorbed on the one side and exhaled on the other. The pipes break by imperfect workmanship or become honey-combed by the action of the gases or are too thin or porous at the start. The pipes being difficult of access are not often examined. We may expect in every house with water closets and stationary wash-bowls in the bed-rooms a crop of diseases when the pipes have been used ten or fifteen years. In the wash-bowls the overflow hole constantly open is most convenient for admitting foul air. In 1872 the medical authorities of Edinburgh reported that typhoid fever and some other diseases were doubled in fatality where water closets were used.

Dr. Fergus states that where water closets were used diseases increased four-fold.

Bath tubs are open to similar criticisms, as vehicles for the delivery of foul gases. The author incidentally raised the question whether in bathing all the body at once we do not by shock, by chilliness or by suspending the functions of so large a skin-surface run more risk than when one portion after another is moistened and rubbed. If closets, and bath-tubs, and stationary bowls must be had in connection with the house there should be an annex, with supply and sewer connections and special ventilation. The house chimneys, when used for this purpose, must be warmed so that downward currents shall not introduce foul air.

Kitchen sinks should either be outside of the house or being well trapped open into a box outside and thus keep the sewer gas away from the cooks, the food and the household. Grease-traps should prevent the grease from running into the sewer and thus obstructing the pipe or fouling it. The sinks of course need a grating so that nothing but liquids can enter the sewer. Drainage as distinct in many cases from sewerage was insisted upon where the soil needs it. Dampness helps to carry infection. Cellar drains should never enter sewers. Indeed even for drainage and when there is a drainage system outside and around the cellar walls it is better that the whole inside space

should have a porous, sandy or gravel bottom, covered with cement. Where because of area or wetness the gravel bed and outside drainage would not suffice, we may put tile aside of or under the sewer and have a separate discharge and flushing if need be.

Mr. Welch advocated less reliance on sewers for animal excretions and approves the tub system. The plan to be adopted must depend on localities and circumstances.

In either case there is danger in the long retention of fœcal accumulations. The idea was mooted whether disease germs may not find their way into vegetables, when excretions containing specific germs are thrown upon land.

As sewers will be made, the paper then discusses details as to them. They should be small, for economy, for quick discharge and for self-scouring and because there is thus less foul air to remove in ventilation. They should not be expected usually to carry the storm water. If large and having little flowage, they should be egg-shaped, with the smaller arc downward. Salt-glazed pottery, hard burned is the best material, as tighter and less porous than anything else.

The objection to small sewers is that they cannot discharge the storm water. This can run the streets as in Baltimore, or it can be gathered into large conduits, discharging at several points where sewage would be inadmissable. The double system of pipes for sewage and others for storm water is generally disapproved, but needs studying in the light of locality, natural drainage and declivity. Sewage and even stream beds need a constant and not too sluggish flow. The place of outflow is important. It should not be into a sluggish stream or into one used below for water supply.

VENTILATION OF SEWERS.

The usual street hole ventilator, if near the curb is unhealthy, and in very narrow, crowded streets with lofty buildings, does not suffice. It is shown that meat kept near such openings is much more liable to be tainted. Open ends of sewers do not ventilate enough. Artificial ventilation has not always succeeded. The air should be sucked, not blown through the sewers, because it is easier to move air by pulling than by push-

ing and because this draws fresh air into the sewer through every opening, and sends the foul air where you are drawing it to instead of everywhere. The current, except at the ventilators, should be into the sewer. The rarefaction in the sewer should not be so great as to hasten the vaporization of noxious matters and enable the bad gases to spread rapidly even against a current. Mr. Welch then exhibited a plan by which the suction could be made cheaply and effectually. Pipes pass from the sewers into a chamber which has the heated air and flame from a self-heating stove. The heat moves the air in the sewer and helps to destroy germs. A high chimney passes from this chamber so that the foul and heated air thus drawn out is sent above the roofs. It is the application of the principle of an aspiratory chimney to each house. In all these improvements now-a-days we suffer more by unwise and dishonest expenditure than by *necessary* cost.

SCHOOL HYGIENE.

H. B. Pierce, Superintendent of Schools in New Brunswick, read a paper on School Hygiene.

Light, ventilation and heating were presented as claiming far more attention than they have received. Belgium with its model school douse at the Centennial had presented to educators an object of great interest. Pure air is introduced near the base of the wainscot around the sides of the rooms, and by an arrangement over the doors and the windows. Foul air escapes through registers in the floor which open with ducts that lead to a patent stove, from which it passes out through the smoke-flue. The foul air near the top of the room passes out through apertures in the ceiling. Valves for the admission of pure air or for the escape of impure air are under the control of the teachers. In no case, it is claimed, is draft permitted to reach the pupil. The Belgian law requires all school houses to be built on this model.

As to heating, most of our school rooms invert the order of cool heads and warm feet. Often with the temperature at 42° at the feet it is 60° at the head, and the pupils then huddle to the stove and roast and freeze by turns. Where hot air comes from the cellar it is often impure, dusty and with too hot a draft.

As a supplement to that of Mr. Pierce, Dr. H. R. Baldwin read

a paper on the subject of *contagious diseases as occurring in and propagated by schools.*

All transmissible disease to which children are liable we include under the term contagious. While children are subject to many inflamatory diseases, to febrile disorders, to local skin diseases and various disorders of nutrition, and to nervous diseases, too often overlooked as fostered by our schools, these communicable diseases need especially to be studied and guarded against, as spread by the assemblage and association of school rooms.

Parrigo Tinea favosa or scald head, mumps, measles, scarlatina, diphtheria, chicken pox, small pox, and whooping cough were especially referred to.

The duty of parents and teachers is to guard against the spread of these. They spread chiefly by the attendance of children from families in which at the time known cases of the disease exist; by too quick return to school of those who have been sick, or by the wearing and use of clothing not thoroughly cleansed and aired.

In New Brunswick a recent epidemic of diphtheria seemed to have been greatly spread by a school. Parents and teachers must be sensitive in observation and guarded in isolation and see to it that proper precautions are used.

The report of Dr. E. M. Hunt, the Corresponding Secretary, gave an outline of the State correspondence for the year. In each county a competent person had been requested to inform as to the general health and any local causes of disease. Communications had been received from many counties and from several cities full reports were given. Those of Newark, Trenton, Camden and Passaic, were among the most important. Replies were given in answer to a series of printed questions. Great defect in sewerage is noticed not only in Newark, but in such towns as Orange, Bloomfield, etc. Not enough attention is given to saturated soil and stagnant water and hence preventible disease occurs.

The water supply of Newark is not satisfactory. In Essex county a disease among hatters is noticed as occuring from the use of mercury in preparation of the stock. Trenton is favorably situated for surface drainage. It is not properly provided with sewers or other methods for preventing the storage of animal

excrement. Miasmatic disease prevails much along the banks of the Delaware. The Seventh ward, which has a hard clay subsoil and is badly drained, suffers most.

In Hightstown there had been much prevalence of malarial and typhoid fevers and of zymotic or contagious diseases. Defective drainage, imperfect sewerage and neglect as to local evils are claimed.

In Passaic there had been an unusual amount of intermittent and remittent fever, consequent upon the draining of a large pond in very hot weather. The need for sanitary authority has we believe since been felt in regulating the health of the city.

In Camden the local difficulties are imperfect drainage, culverting and imperfect erection of buildings. Some of the factories are regarded as detrimental to health. Since some improvements have been made in the drainage of the city there is manifest decrease of miasmatic disease.

Newton, Sussex county, reports itself as a region of lung diseases. There are some evidences that the wells are not always good, and butter working on a large scale as at present conducted is said to be injurious to the health of those in the milk houses and factories.

In Hackensack, Plainfield, Raritan, Rahway, etc., there are the usual complaints as to the existence of local and avoidable evils.

In a review of all these reports it is very evident that most of our towns and townships lack information and intelligent supervision in sanitary matters. There is often acknowledged imperfection of sanitary methods, but little of that co-operative work which insures systematic and effective dealing with the evils. Some of our cities have organizations more or less effective and some smaller towns like Montclair have taken the work in hand with commendable foresight. Such a system of statistics as shall be informatory and such definite local enactments as shall reach special needs are yet to be devised.

The third annual meeting of the Association was held at the School of Science, Princeton, October 17th and 18th, 1877.

SCHOOL HYGIENE.

The Committee on School Hygiene reported through two of its members. The Rev. C. L. Brace as Chairman, after reckoning the importance of the subject by the number of children and the magnitude of the interests involved, proceeded to state the several particulars which most demand attention, and to specify what seemed most desirable in respect to each. Locality should be chosen with reference to healthfulness of ground and without too close proximity of other buildings since light, free air and freedom from noise aie so desirable. He approved the suggestion of Olmsted that the corners, not the sides, should be to the cardinal points of the compass, so that the sun's rays would reach every window at some period of the day. Buildings should be not more than two stories high, with rooms for not over fifty pupils. Air space as well as floor space must accord with the amount claimed by standard authorities.

Windows should have blinds on the inside by which light could be regulated. The sash should not be nearer the floor than four feet, but reach nearly to the ceiling. No window should be placed in front of a scholar.

Desks must suit the size of the pupil and also should vary in angle somewhat, according to the work at which he is engaged. The subject of ventilation was fully presented, with the usual facts as to the amount of change of air required.

If furnaces are relied upon for heating great care must be had to avoid red hot cylinders or stoves with badly constructed joinings. When exit pipes are provided for the discharge of used up or foul air, we must be sure that their temperature is such as to secure an upward draught. A central foul air flue inside of the chimney often answers a good purpose. When steam is used steam-coils in the escape flues accomplish the same. S. B. Ward, C. E., has suggested that steam radiators be placed under and in front of each window, there being placed over the radiator and extending to the window sash a marble or other shelf, with a space of three or four inches between it and the bottom of the window. The theory of this is that by raising the lower sash its edge thus coinciding with the shelf in height a strong current of cold fresh air flows in over the radiator, is warmed and diffused through the room.

If stoves must be used, they should be of sheet iron with a brick lining. A stove after the plan of Mr. Stuart's, as described in the "Sanitarian," was advocated as a means of carrying off impure air.

Mr. George Pressey, of Hammonton, has successfully in use a modified method.

The rooms of the High School, in Hammonton, are relieved of their impure air by a box seven inches by eighteen, leading into the chimney by a duct under the teacher's platform. This box is closed by a slide until the fire is made in the stove, when it is opened, the air is carried out, especially the lowest stratum.

The method of introducing air into the Hammonton school building is also described and highly commended. The stove is partly inclosed with a sheet iron case, extending to the floor. Between the case and the stove an opening is made in the floor, fitted with a register about twelve by eighteen inches. This leads to a box placed between the floor and the ceiling, that runs out between two joists to the side of the house, where it is protected by a screen. When the stove is heated the register is opened and the air rushes up coming in contact with the stove and ascends to the ceiling, then makes its circuit through the room, and comes down and passes out through the duct under the teacher's platform. It is important at recesses always to flush school rooms with pure air from open windows, even at the loss of some heat.

The subject of Humidity in its relation to school-room temperature was discussed, and the importance of attention thereto fully illustrated.

Laban Dennis, M. D., presented a paper on the same subject. He noted that within the school age are embraced two hundred and ninety-seven thousand persons, or about one-third of the population of the State. They thus exceed by fifty thousand those engaged in mechanic arts, and fully equal the numbers employed in any two of the great classes of occupation in the State. There are no gatherings of individuals in the State that approach in magnitude or importance to those assembled daily in our schools.

The paper then treats in order of the various subjects: (1) of location; (2) construction and outbuildings; (3) light; (4) venti-

lation; (5) heating; (6) furniture; (7) discipline; (8) personal habits; (9) physical exercise.

All these matters should claim the attention of every citizen and of every physician. But especially must we insist upon instruction in the schools themselves. Beginning with our primary schools and reaching through our highest institutions of learning, there should be regular, systematic and scientific instruction either didactic or practical in anatomy, physiology, hygiene and general sanitary science. This should be made obligatory. Life is the first and greatest subject of secular instruction; how to preserve, protect and prolong it, how to surround it by such influences and circumstances as to contribute to the development of those noblest of God's creatures, types of perfect manhood and womanhood. Allusion was made to the neglect of this department in the otherwise excellent schools of Newark.

Great encouragement is to be derived from the fact that the pupils themselves become ardent helpers. It is a study in which they delight and which introduces them to the whole domain of natural history. If the sentiment and effort of all now aroused could be combined in fifteen years it would revolutionize our systems of education, add greatly to the sum total of human happiness and save thousands annually from premature death.

VITAL STATISTICS.

The report of the Committee on Vital Statistics was made by Dr. Bodine, on three points, as requested by the Council:

First.—The history of legislation in New Jersey on the subject of Vital Statistics.

Second.—A discussion of methods of obtaining these statistics in other States.

Third—Suggestions of improvements desirable or obtainable in the registration of these statistics in this State.

The paper recounted the various steps of legislation in the past. Reference was made to the methods adopted in Great Britain and in our country, chiefly in the States of Massachusetts and Michigan. As to improvements in our State methods, the writer doubted the practicability of the attempt, not because it

is not eminently desirable, but because the knowledge and appreciation of our citizens is not sufficient to secure intelligent legislation.

STATE WATER SUPPLY.

The report of the Committee on Water Supply was made by Prof. A. R. Leeds, of Stevens Institute, Hoboken. The report was divided into two parts. The first notices the various water basins or water sheds into which the State is divided. The Hackensack basin of about one hundred square miles: the Ramapo, one hundred and forty-eight; the Kingwood, one hundred and eight; and the Rockaway, one hundred and sixty-five, are examples. As a specimen of amount carried, the drainage of the Hackensack basin is fifty-two billions of gallons annually. The relation of these to the water supply of cities to manufacturers and to deposit of refuse was then traced, and the figures of L. B. Ward referred to as showing the bearing of all these upon health. As an instance, in making wool into fine cloth it passes through forty steps, in ten of which water is used, and some of the impurities are putrescible nitrogenous matters of the most dangerous kind. While manufacturies are to be aided, water contamination must be carefully guarded. Our great water sheds end abruptly in alluvial levels. Those high up upon them think nature designed them for mill sites and to carry off sewage. Those lower down in the great cities want them both for water supply and for sewers. Besides the great forests of our mountains help to make ozone and good air, but these are being rapidly removed. The report described the process by which the rain, the leaves and the atmosphere are at work in the great alembics of the hills, to distil pure water and pure air for the plains, and how this is disturbed, so that our crowded and populous cities toward tide water are robbed of the life forces. Malaria and confervoid growth takes the place of natural equilibrium and aeration and oxidation are disturbed. Sickness comes, but the scare goes over and the rivers cleanse themselves again in time for some chemist to assure the people that the water is good, and sewage does no harm. The paper then speaks of makeshifts for evils, such as the present plan of a dam across the Passaic at Belleville. It then refers to the hope

of an ultimate water supply derived directly from sources high up in these water basins, and to such utilization or disposal of sewage as will prevent the fouling of water courses. Reference is made to the annual report of the State Geologist of 1876, as giving a valuable summary of facts.

The second portion of the report examines in extenso the fish epidemic of the last Summer as affecting certain streams. All sorts of explanations were given of it, by the papers until finally it was attributed to the washing in of Paris green intended for the Colorado beetle. An interesting letter from the Fish Warden, J. C. Roe, attributed it to the low water and drought. Professor Leeds visited Paterson and made some examinations of the water. The low water and warm weather had produced large quantities of aquatic plants of a low order of vegetable life. After reviewing various opinions he presents the hypothesis that the mortality resulted from intense heat upon the river beds bare or slightly covered with water, and the rapid production of vegetable organisms more particularly spores, poisonous to fish life. Also by the organic impurities thus mingled with the water, the supply of dissolved oxygen in the water is diminished so as not to leave enough for the fish. The floating algæ on the surface would also interfere with æration. At the same time there would be an increase of foul gases inimical to life. Professor Leeds gives most prominence to the last or deoxidation theory. The condition of heat, dryness, etc., did not continue long enough to pollute the waters far below. Plant and fish life have much to do in aiding us in determining the state of the water supply. Disagreeable taste and odor are sometimes given to water for a time as especially by the odor of plants of the order *Nostochineæ*. Some interesting facts were given as to the tracing of various tastes and smells from plant-life or plant decay. Professor Cook exhibited a specimen of water thus affected, which was very disagreeable, to a plant of the wild turnip species, but not yet proven to be harmful. Various other plants were referred to as identified in giving peculiar odors in their decay, and some as producing bacteria. Questions of water pollution and purification are closely connected with all these points.

Professor Leeds then traced the improvements made in chemical analysis of waters, but deemed these not sufficient alone. A report as to one of the rivers of France shows how important a

test is afforded by animal and plant life as well as by the chemistry of waters. He gave his preference to the "combustion process" for determining the nature of organic matters present. The determination of the amount of dissolved oxygen present is of much sanitary importance. The chemist, the botanist, the microscopist, the biologist, are all needed in studying water supplies.

WELLS.

The paper on wells by Prof. H. B. Cornwall, of Princeton, discussed the various chemical methods of testing waters, and the need of careful comparison of results obtained by different processes. Several actual analyses were furnished. The value of cisterns and the feasibility of the use of small cisterns for drinking water where the character of ground supply is doubtful, was shown.

Prof. Cornwall has extended his study of this subject in a paper contained in this report.

STATE DRAINAGE.

Prof. Geo. H. Cook presented some notes on the subject of State drainage. He argued and illustrated both its pecuniary and sanitary importance, illustrating his subject by detail as to the history of the great meadows on the Pequest river in Warren county. His delineation of the change which is taking place by reason of the deepening of the outlet some five or six feet, was of the most satisfactory kind. Already growing crops attest the value of the reclaimed lands, and thousands of acres will be added to the productive territory of the State. Prof. Cook rightly claims that not all the cost should fall on the immediate land owners, as the whole adjacent region shares in the benefits.

SEWERS AND SEWAGE.

The report of the Committee on Sewers and Sewerage was made by Dr. H. A. Hopper, of Hackensack. The first proposition of Dr. Hopper is that drainage and sewerage must be distinct.

Sewers must have solid masonry, free of leakage and must not let in sub-soil contaminations. There must be proper descent. He gave his adherence to pipes of only sufficient instead of large calibre. He advocated ventilation by flues along side of chimneys in houses, both for the main sewers and connections, and objected to so numerous street openings. Mr. Ward, the other member of the committee, did not see how we could dispense with street openings. There must be abundant water for flushing. The opposite views of Letheby and Frankland as to water pollution of rivers was discussed. Water traps and sewer gas as the result of obstructed decomposition were noticed. The present out-door water closets were unequivocally condemned. The earth system is capable of greatly modifying and improving it. Four and one-half pounds of dried earth suffice for each person.

As to the disposal of house sewage in towns and rural districts the views of Waring, Town and Bayles were discussed and doubts expressed as the availability of Waring's system of sub-irrigation in cold climates. Letheby also thinks that vegetables raised on such soils may convey the ova of parasites and cause entozoic diseases. Water cresses, celery, lettuce, etc., eaten in a raw condition are especially objected to. Mr. Bayles asserts that he has seen carrots raised on such saturated soil, noxious both to taste, smell and appearance.

A paper on Sewerage as had been requested at the former annual meeting, was then read by Col. R. S. Swords, of Newark.

The paper of Col. Swords gave the early history of sewers—referring to Assyrian, Jewish, Roman and other authorities. The drainage and sewerage of houses, of towns, and the disposal and utilization of sewage matter were consecutively discussed. The drainage of the houses should be so good that the cesspool should never exist as a storehouse for filth. The movable closet and water-tight receptacles should be used, contents being frequently removed. They should be deodorized by charcoal, dried peat mixed with sulphate of iron (copperas), or other cheap material, and be utilized for agriculture. Where house drains are necessary, they must be kept away from wells and cellars, and empty, if possible, from a slope through close jointed, and never less than four inch pipe. The main drain pipe should be trapped outside, near the house. The Soux earth

closet was recommended for family use, and the benefits in health illustrated by cases.

The London and Paris sewer systems were noticed in detail, as well as the history of the sewers. The description of Victor Hugo of the old Paris sewer was given, and believed to be founded on fact. The sewers of London so stagnated the Thames that Franklin, one hundred years ago, inquired, "Does the water of the Thames return to the sea?" The present system, that of Bazalgette, secures the drainage both of rain-fall and house sewage, and is carried into the Thames twelve and a half miles below the city, and through reservoirs let out at a proper state of the tide. The benefits of sewers were illustrated by improved health rates, and the remark of Dr. Farr quoted, "That it is as certain that a high mortality can be reduced by hygienic appliances down to a certain limit, as it is that human life can be sacrificed."

The separation of drainage and sewerage and of animal excrement from all household sewage was advised.

The various plans of utilization and disposal of sewage were then noted, such as Filtration—simple subsidence—Irrigation, Downward Filtration and the Liernur or Pneumatic system. There must be more attention to utilizing excrement and where cess-wells are used they should be as tight as cisterns.

The Fourth Annual Meeting, at Stevens Institute, Hoboken, opened with an address by Prof. A. R. Leeds, Ph. D. He made a rapid survey of the progress of sanitary science, and insisted that most of the work could be better done by States than by the General Government. Vital statistics were claimed as the foundation stone of exact sanitary science, and the progress therefrom illustrated in detail by a review of the New York City methods. Our own system, as recently adopted, was highly commended—the importance of registration of disease urged. The relation of sanitary science to education was unfolded and detailed facts given as to the model method pursued at Amherst College. It is not a mere gymnastic system, but a professorship in which physical takes its place by the side of intellectual and moral instruction. The bearing of invention on sanitary science was illustrated by the effect which the electric light might have on questions of heat or ventilation. The need of close sanitary

surveys was shown, and the survey of localities now being conducted under the patronage of this association warmly commended. Experiments upon the composition of the atmosphere of different localities were claimed as of great importance. In England the government has appointed Dr. Angus Smith as Air Inspector. In Glasgow a City Analyst has been recently appointed with this special duty. New York is already showing the effect of the sulphurous and nitrous vapors sent out from its myriad chimneys. In Philadelphia there is scarcely a house front which is not disfigured by some stain of magnesia and lime salts, a result in part due to the acid vapors in the atmosphere. Ozone is an important constituent of the atmosphere, but the percentage present is difficult of test. For many months past important experiments as to it have been in progress in the laboratory. We are seeking to make contributions toward a chemical climatology, which is greatly needed to supplement and assist meteorology, agriculture and the study of disease.

PHYSICAL TRAINING.

The next paper, by J. Madison Watson, A. M., treated of the hygienic relations of physical training in schools and colleges. He noted the excellent theories which obtained as to the need of developing the body with the mind, and the sad contrast in practice, presented by modern methods of education. There must be created a public sentiment for educational gymnastics. But when other difficulties are removed, the system of gymnastics so carefully and ingeniously elaborated by the French and the Germans, and usually employed in this country, involving the use of fixed apparatus, presents many obstacles that render its general adoption almost impossible. He did not condemn heavy gymnastics, especially when taught by a suitable instructor. But we seem to have been formed less for bearing herculean burdens than for the vocations which require flexibility, poise, grace, ease, rapidity of muscular action and a general diffusion of muscular vigor.

What has been necessary in order to render physical culture universal, is an extensive and varied system of light gymnastics, both with and without apparatus, well adapted to all places, ages and conditions of life. The primary office of school calis-

thenics is to beautify and strengthen the body by pleasurable exercises which shall develop, regulate and perfect its parts. It is mainly recreative, giving relief to the mind while gratifying the physical sense. It is to be sharply separated from care, brain-labor, ailments and disease. Hence, *first*—an essential element of success and such a natural, systematic and logical arrangement of the subject that each position, each class of movements shall suggest what is to follow without taxing the memory or other faculties situated in the cerebrum. *Second*—a simple, systematic and complete series of commands is essential. *Third*—the movements must have not only a determined form and order of execution, but a determined time, the rhythm or division of which shall be well established in the mind. Musical gymnastics and all modes of marking time should be used. There are six varieties in counting, five in recitation, and six in music and in phonetics. Vocal gymnastics, of which so little is known, either theoretically or practically by the masses, is transcendently interesting and important. During the use of light indoor gymnastics the air of a room can be changed without risk to the pupils. Gymnastics must never be used as a substitute for play. Do not attempt to suppress the animal energy and unharmed enjoyment of your vigorous child, be it boy or girl.

Educate higbly, the higher tbe better, so that you educate symmetrically; but do not defeat the chief end of your noblest efforts by producing physical degeneracy.

The question of compulsory education, confined strictly to tbe intellectual faculties, is one of grave doubt; but our sanitary material, and military interests imperatively demand the best system of physical training in all schools, and corrective institutions that are sustained, wholly or in part, by the State. The graduates of normal schools, and the public teachers, must be proficients in gymnastics and successful physical trainers of youth.

All schools, both public and private, by legal enactment, should be subjected to the ablest medical supervision.

Our ideal instructor of youth is one who most successfully prepares the student to satisfy, unaided, all the requirements of life; our ideal physician, one who so regulates inherited and other defects, and promotes the health of those under his prac-

tice, as most successfully to avoid the need of remedies for disease.

J. T. Hilton, City Surveyor of Paterson, then treated of the construction of sewers.

First of all, there must be study of each locality. In the size and shape of sewers we must be governed by the material of which they are made and the amount of liquid to be carried. The egg-shape is preferred, as the concentration of the water in the small space at the bottom prevents the accumulation of sedimentary deposits. As the country is subject to violent storms, the basis of one inch rain-fall per hour as the maximum fall, as given by English authorities, will not suffice where the sewers need to carry storm water.

None of the sewers we construct are of a less grade than two-tenths feet per one hundred. If we cannot get the required ten feet depth at this grade, we take less rather than get below this low gradient.

By a diagram a method of sub-drain was shown. The cost is but 12 per cent. additional. If more generally understood this would probably end the discussion as to the availability of the same conduit for sewerage and sub-drainage. Attention was called to an important improvement for tight joints in pipe sewers known as "Stanfords Patent Joint." It seems to afford a tight joint without the use of cement. What we want in construction is good material and workmanship, true grades and tight joints, with the sub-drainage separated from the main flow of the sewage. The subject of house and basin traps is discussed, the former meaning those between the main house pipes and the outside sewer, and the latter those of bowls, closets, etc. For the former, preference is given to traps without valves, with two apertures for ventilating pipes, which help the efficiency of the trap and ventilate the sewer. A perfect house trap will prevent obnoxious gas from passing beyond the cellar walls. Much depends upon the proper placing. Our great danger in basin traps is the siphoning of the water.

It is due to two causes, the lodging of solid matter in the trap and more frequently by a heavy draught of water passing through them and a possible suction from the main sewer, a vacuum is created which exhausts the water from the bend.

For the ventilation of sewers free openings into the streets

and house pipes, connecting with the sewers and extending to the roofs, are advocated.

Instances coming under his own observation are given where sewer air was being directly driven into houses.

The paper of Professor H. B. Cornwall, on Springs, Wells and Cisterns, discusses the sources of water supply and how best to protect them from contamination. It does not admit of such condensation as to be of service. Some of the more important suggestions will appear in our report in another form. It is due to all the authors of these various papers to say that this outline deals only with the conclusions of most practical utility, and omits the larger portion of papers, all of which are worthy of preservation in their finished and original forms.

VETERINARY REPORT.

BY J. C. CORLIES, D. V. S.

The State Board of Health, in its effort to ameliorate the sanitary condition and subserve the best interests of the State, early foresaw the necessity and importance of including in their annual report the live stock of the State. With that object in view an article appeared in the last regular issue, stating that as soon as it was possible a Veterinary Department would be added to the Board, whose duty would be to carefully look into the past and present sanitary condition of the live stock, and report upon the same. The importance of this step cannot be over estimated. The suffering animal creation calls for aid, and to the skilled Veterinarian must we look for assistance. Note first of all the fact that we have in the United States, at the present writing, no less than—

Horses	10,500,000
Mules	1,700,000
Milch Cows	11,500,000
Cattle	19,250,000
Sheep	35,740,000
Swine	24,135,000
Making a sum total	102,825,000

These animals aggregate the vast sum of $1,696,620,750, to say nothing of the great number of valuable dogs requiring medical attendance. When we consider the amount of wealth invested in this shape, we must appreciate the laudable efforts put forth, not only to ameliorate the sanitary condition of the same, but to secure to our own State, through her live stock, a great material interest.

VETERINARY SCIENCE.

There are at the present time less than two hundred skilled veterinarians practicing in the United States; one to every one

hundred and fourteen thousand one hundred and twenty-seven animals; and in our own State but three or four, with room for at least two hundred. In lieu of skilled talent, stock raisers are required to employ stablemen and quacks, who know little or nothing of the many diseases they are called upon to treat. To this fact may be attributed the low estimate in which the veterinary profession has been held in the past, and we are reluctantly compelled to acknowledge, is being held by the public still. What we need is more educated veterinarians distributed throughout the country, as the past has satisfactorily proven that skilled talent, though having many obstacles to overcome, is being felt and generally appreciated.

When we consider what has been and what may follow one of those terrible visitations, that have from time to time invaded European countries, in the form of pleuro-pneumonia, foot and mouth disease, rinderpest, anthrax fever, and many other contagious and infectious diseases, who are we to look to but the man skilled in the use of veterinary means and medicine. We are informed that during the last century in Europe no less than two hundred million animals died of rinderpest and foot and mouth disease. To veterinary science alone is due the fact that its opportunities for extension have been so largely checked. The English government wisely saw the importance of appointing skilled veterinarians as commissioners to look after their live stock interest. Should not we, the great American people, second to none in the number of our live stock, profit by their example, not knowing how soon the same scourge may visit our continent? It is not only a necessity but a duty devolving upon us to foster veterinary schools, and urge upon our young men seeking a professional education to embrace a favorable opportunity and be prepared to prevent fatal disease, and thereby become public benefactors.

Up to 1864, although abortive attempts had been made both in Massachusetts and Pennsylvania to establish veterinary schools, there had been no regular lectures delivered. At this time the New York College of Veterinary Surgeons commenced a regular course of lectures, with a full corps of professors, and with seven students attending. The institution continued to flourish up to 1874, when owing to internal dissensions the doors closed, and the College shared the fate of

its predecessors. Soon after a part of the faculty, with Dr. Alexander Liautard at their head—he having in the meantime procured a suitable building—associated themselves together, procured a new charter, and brought into existence the American Veterinary College. Too much praise cannot be bestowed upon the members of that faculty for their laudable efforts, and Professor Liautard more especially, whose zeal and fidelity to veterinary science entitles him to rank as the father of veterinary medicine in America. A Frenchman, who graduated with honor at Alfort, France, in 1854, he came to this country in 1860, and was associated with the first efforts to give to our, his adopted, country that veterinary science and art of which she stood so much in need. He has continued ever since to work zealously and indefatigably, spending the best years of his life and much money for the promotion of veterinary science. To-day he has the proud satisfaction of witnessing the flattering result of his tireless efforts. Strange though it may appear that the two great English speaking nations owe whatever progress they have made in veterinary medicine to Frenchmen. England honors her Bell, and America her Liautard.

The importance of veterinary medicine is being felt all over the country. Agricultural societies, extensive stock raisers and others are becoming deeply interested, feeling that they cannot longer afford to risk their valuable herds to the frequently occurring epizootic and enzootic plagues that so often decimate their ranks, without some avilable means to combat their influence.

No branch of science presents a wider field and offers greater facilities for investigation and experimentation. Physiology yet in its infancy owes much of what it is to veterinarians and veterinary science. Experiments performed on the lower animals have been the direct means of adding greatly to our knowledge of that most important of all physical studies. An animal becoming unfit for further use may be utilized, and it should be the duty of the veterinarian to report the result of his researches to not only his own but the sister profession. Operative surgery likewise could receive a stimulus, and perhaps advance by first performing important operations on the lower animals, and reporting the results. The operation of tenotomy now being so generally employed, and with such happy results, was first performed on the horse, and there is no reason why other opera-

tions equally as important should not follow. It likewise offers excellent opportunities for the study of pathology and morbid processes, while our knowledge of the action of special remedies has been largely gleaned from their having been first administered to the lower animal. We feel it our duty to earnestly impress upon all veterinary practitioners the importance of utilizing these excellent opportunities by deep scientific research, and by so doing aid practical medicine and surgery as well as reflect credit on our profession.

SOME OF THE CHIEF EPIZOOTICS OF CATTLE.

The most prominent is pleuro-pneumonia. We find it first made its appearance in this country in Brooklyn, in 1843, and in New Jersey in 1846. Dr. Chas. Michner, who has given the subject careful attention says, "it first broke out in 1847, in the herd of Mr. Thomas Richardson, he first finding it among his imported stock, and knowing its malignancy, immediately resorted to occision, at a very great sacrifice, thereby stamping it out. Again, in the Summer of 1855, (six years before it made its appearance in Massachusetts,) J. L. Jacobus bought twenty head of cattle in New York, which he turned into pasture three miles from Chatham, N. J. In about three weeks, in going to look after the herd, he found two had died, and three more were very sick. The remaining fifteen did not develop the disease. At about the same time, Dr. Munn, of Chatham, N. J., purchased some cattle from an apparently healthy lot, which he yarded with his other stock, when the disease made its appearance among his other cows, some of which soon died. From Dr. Munn's herd the disease was communicated to that of Mr. Lunn, who also lost several animals. Mr. Abraham Johnson, living near Newark, also purchased some cattle in New York which developed the disease in a short time after he brought them to his farm."

Dr. Michner informs us it was on this farm the first scientific post-mortem examination was made, being conducted by Dr. C. C. Gryce, of New York, in the presence of several physicians.

In 1843 there came from Europe in a steamer, a cow kept for the purpose of supplying the passengers and crew with milk. Upon arrival, she was sold in Brooklyn, where she went into a stable

among a number of other cows, some of which soon presented unmistakable signs of malignant pleuro-pneumonia. As they were diposed of to the butcher the malady did not spread. That case marks the advent of the disease in the United States. We are informed it made its advent into Camden county in 1858, and into Gloucester, in 1859. At that time it was raging extensively in Massachusetts. Mr. J. E. Hancock, of Burlington county, bought some cattle in Philadelphia, in 1861, which introduced the disease in his herd.

An outbreak occurred in Clinton, N. Y., in August of 1877. A Mr. Cramer bought a cow from a car load that came by rail from Ohio to New York, from whence she was shipped to Clinton. This cow soon sickened and died, and though no post-mortem was made, it was believed that she died of malignant pleuro-pneumonia. From that time the disease began to show itself. Out of J. C. Cramer's herd of forty-two head, twelve died, five got well under treatment, and fourteen were destroyed before they had time to develop the disease. The disease was communicated to cattle belonging to Michael French, by pasturing in a lot adjoining Mr. Cramer's, eight of which contracted the disease and four died. Several others likewise lost more or less at the time. It is believed that the disease has not been entirely eradicated, and is liable to break out at any time, notwithstanding energetic and severe measures were adopted.*

In 1873 it visited several farms in Burlington county, causing a loss of one hundred head, where it was introduced by cattle from Pennsylvania.

In 1871 it appeared in Ocean and Camden counties, causing great loss.

In 1872 it appeared in Essex and Union, where it decimated many herds, and where it has existed to a greater or less extent ever since. While the malady was raging so extensively in Massachusetts, the Legislature wisely passed an act providing for the appointment of a commission of three, with power to slaughter all affected cases, and cause all places where it had existed, to be disinfected, and the slaughtered animals to be appraised and paid for by an appropriation from the Legislature.

"The earliest traces of this malady seems to place it in Central Europe, but nothing definite is known of it till 1769. From

*See American Veterinary Review.

that date down to 1789 the malady appears to have been confined to the mountainous regions of Switzerland (Fleming) but the increased commercial relations of countries soon carried it to other districts. It invaded Prussia in 1802, and soon spread over North Germany, reaching Great Britain in 1841, and the United States (Brooklyn,) in 1843," New Jersey in 1846, and Boston in 1859.

Its character is that of a specific contagious disease, peculiar to the bovine race, and wherever it appears it causes an immense destruction of life. It usually appears as an epizootic or enzootic. It is thought that as a rule young and plethoric animals succumb to its ravages first. It may terminate in death, or partial recovery in favorable cases. Convalescence is slow, and the cough will last for a long time.

"The infecting principle of the disease is fixed and volatile, and exists in its greatest intensity in the air expired by the sick animals, and probably in the secretions and excretions, and the air may carry it a distance of three hundred feet. The vitality of the virus is very tenacious, often retaining its virulence for a period of one hundred days." The mode of infection is through the respiratory passages. The incubation period has not been settled. Some authorities say it may exist in the system in a latent form for six or seven months. Its mortality may be computed at fifty per cent.

SANITARY MEASURES.

Our object should be to adopt measures to prevent its spreading to districts where it has not appeared, and to eradicate it in localities where it has already manifested itself. When it has made its appearance, no pains should be spared to inform cattle owners of its presence, who should at once resort to every available means to prevent its further spread. The infected animals should be slaughtered and buried with due precaution, so as not to be unearthed by dogs. Animals suspected should be quarantined.

A good deal has been said about inoculation. This question we shall discuss at some future time. The operation consists in taking some of the serum from a diseased lung while in the first or febrile stage, (the animal being destroyed for the purpose,)

then make a small incision in the lower extremity of the tail, introduce a few drops of the serum and apply a bandage for a few days. If the operation is successful, in about a week to ten days there will be observed a slight constitutional derangement, with swelling of the tail at the point of incision. The only inconvenience following the operation is a loss of a portion of the tail in about ten per cent. of the cases operated on. Of all the diseases which infest the bovine species in this country this is the most to be dreaded. Too much importance cannot be attached to the necessity of guarding closely all thoroughfares by which it may enter a district. Occision and inoculation being the only means by which its spread may be arrested, it is incumbent on the Legislature to enact a law making it incumbent on stock raisers to have their animals examined by an expert, who should be appointed by some delegated authority, and who should be invested with power to exercise occision or inoculation, as the circumstances might demand, and by that means the malady could be kept in check. Next to pleuro-pneumonia, no other disease is so fatal or causes so much apprehension as

SPLENIC OR TEXAS FEVER.

It is an enzootic disease, the pathology of which is now well understood. That it is of an anthroid nature we have little doubt, and not of a malignant typhus or typhoid nature as has been claimed by some. It seems to be exclusively American, originating in Southern cattle, and transmitted to others by direct contact. In 1868 it led to serious trouble, and came near causing a suppression of cattle traffic between the Gulf and Northern States. The disease presented a decidedly striking difference from that which anthrax presents in Europe. A peculiar feature of the malady is that an animal may seem in perfect health at night and be found dead in the morning, the symptoms never being marked and causing but little apprehension. After death, and in making a post mortem examination the only marked pathological lesion is found in the spleen which is found swollen to three times its usual size and of a dark color, and usually with its capsule ruptured. When an animal becomes affected it will seek seclusion by keeping from the rest of the herd, become

stupid, suddenly fall down and die without a struggle. Decomposition quickly follows. The New York Commissioners' report of 1868 says, we have not heard of a single case in any animal that has not been in contact with Texas cattle, or their excrement. The affection is communicated through the medium of the excrement. Animals contracting it from Southern cattle do not communicate it to other natives. The virus appears to be eliminated from the system after a few weeks spent in a Northern climate. It has an incubative period of two weeks; though it may be extended to as many months. The winter is unfavorable to its development. That it is a source of serious apprehension is sustained by the fact that in 1872 the mortality in three Western States alone amounted to twenty thousand animals. As in pleura-pneumonia medicine proves almost inert, but much may be gained by a well regulated sanitary police. We occasionally see or hear of a case but to what extent it now exists we have no means of knowing.

APHTHOUS FEVER,

Known as foot and mouth disease, is a form of vesicular fever. It comes into this country from Canada, where it has been carried from diseased cattle brought from England. But little is known of its early history. It is an aphthous (or eruptive fever), epizootic and contagious, affecting the skin and mucous membrane of nearly all the domestic animals. We are, from our limited knowledge of its pathology, unable to account for its causation. It is characterized by an eruption of vesicles in the mouth, and interdigital spaces of the hoof. The thermometer indicates a rise of temperature, which may run up to 104° or 107° Fah. The animal refuses to eat, saliva falls from the mouth with grinding of the teeth. When the feet are affected the weight will be frequently changed from one to the other foot. With a short, jerking motion, the animal will stand for hours refusing to use the sore feet. When the mouth is affected there are seen on its lining membrane, gums and tongue, small white ulcers the size of a pea. When the udder is the principal seat of disease the vesicles are found grouped in clusters around the orifices of the teats. When recovery is about to take place it is not uncommon to see large patches of epidermis come away from the

mouth. The contagion of this disease is both fixed and floating. It has a latent period of from three to ten days. Its mortality is but trifling, as it readily responds to treatment. The disease exists in some of the Western countries, but to what extent is not known.

RINDERPEST.

Of all dreaded diseases to which the bovine race is subject none causes so much apprehension as the above, which is more familiarly termed in Europe *The Cattle Plague.* Fortunately it has not as yet made its appearance in this country; at least we may draw that conclusion from knowing its fatality and tendency to spread, feeling sure it could not stop at one or two cases. The only source from which we may expect it is through importation and too much care cannot be exercised in having all imported animals undergo a rigid quarantine for the full incubation period.

SPECIAL DISEASES.

Dr. J. V. Corlis, of Monmouth county, reports an unusual number of cases of parturient apoplexy for the year, with an increased mortality. Dr. J. C. Dustan, of Morristown, has also met with an unusual number of cases during the early spring and summer months, and states that the mortality has been much greater than formerly. In our own practice we have met with a number of cases, and think the fact may be attributed to the plethóric condition of the animals, as we have invariably found them carrying an abundance of flesh, and with the blood vessels engorged. We believe the trouble is greatly due to the high standard of feeding that milch cows are subjected to, as well as the mild winter, and would impress upon farmers the importance of seeing that breeding cattle get laxative food a short time previous to parturition, and what would be better to give them an occasional mild cathartic.

CATARRHAL FEVER,

Or hollow horn, is a malady of the spring months, and one that causes a deal of trouble among badly kept animals, but shows a falling off, probably owing to the genial weather of last winter.

HOVE.

We are in receipt of a number of communications from various parts of the State, informing us that a number of calves died from this malady. We usually find it prevalent where there is an abundance of red-top clover. Large quantities being taken into an empty stomach in the early morning while wet with dew, fermentation takes place, and a gas is generated which soon distends the rumen or first stomach to its utmost capacity. If the animal does not get immediate relief, death invariably follows. For such cases every farmer should be provided with a trocar and canula, and understand its use, as the delay in securing a veterinarian might prove fatal. We recommend the use of the trocar only in cases that will not respond to rapid exercise, bi-carbonate of soda, ammonia, &c., freely given per mouth.

STRANGULUS FILARIA.

On October 24th, I was called to Morristown, to see a herd of calves, belonging to Mr. J. G. Foote, said to be ailing from an outbreak of pleuro-pneumonia. After carefully noting the symptoms, I had an intelligent history of the malady from Mr. Foote. On August 10th and 19th, he bought two lots of calves out of a drove, which were said to have come from Sullivan county, N. Y. On the 24th, he bought another lot from a different drove, said to have come from either the northern part of this State, or across the line into Pennsylvania. They were turned into a rich timothy pasture together. On going among them September 10th, he found that many were coughing, and two had died.

When we made an examination we found nearly all of them suffering from a severe and irritable cough, and which seemed to come entirely from the lungs, and was accompanied by a peculiar grunting. The rumen in all of the affected cases was distended with food, and we found a very weak pulse of seventy-six, respiration, sixty, and temperature of 106° Fahrenheit, with the visible mucous membranes very aenemic; the schneiderian membrane ulcerated, and with a slight discharge from the nose. The most remarkable feature of the case was that the animals continued to eat voraciously up to the time of death. Mr. Foote

having kindly placed the herd at our disposal, we at once destroyed two of them. On making a post-mortem examination we found the bronchial tubes largely filled with a *filarial* deposit, which on close examination proved to be a parasite. Many having died and others fast approaching dissolution, we prevailed upon Mr. Foote to place some of the least affected under treatment and report the result, which he promised to do. A very interesting question arises whether both herds coming from different parts of the country brought the disease with them, or whether it was acquired by contact, or generated on the farm. The last does not appear probable, as I have since learned that other calves, purchased from the same drove, and owned miles away from Mr. Foote's farm, also developed the same malady. We shall continue our investigation and hope to arrive at some satisfactory conclusion. We will close our brief allusion to bovine diseases by insisting upon the necessity—

1st. Of Ports of Entry.—There is, at the present time, and has been for a number of years, quite a large commercial traffic in cattle between this country and Europe. Through that traffic can be traced the advent of pleuro-pneumonia to this continent, and who doubts but in a little while we will be made to realize in our midst that most dreaded of all animal plagues, rinderpest. Too much care cannot be exercised in trying to avoid it. There is no easier or better way than to have Ports of Entry. Two or three at most will be sufficient for each State. They should be guarded by a Veterinarian, with powers delegated, if necessary, to place all suspicious animals in a strict quarantine for the incubative period, and also to exercise occision when it may be deemed essential. By this means alone we can hope to obtain immunity.

2d. Of the Stamping out Process.—We believe power should be invested in some qualified person as State Inspector; to investigate all outbreaks that occur, and he be delegated with power to kill if necessary. The animals destroyed should be appraised, and the owner compensated by the State. The process of stamping out would soon be complete, and thousands of dollars saved to the State annually.

DISEASES OF HORSES.

There is perhaps no class of animals, except the human, that attracts such attention as the horse. Although this outline is only introductory, we feel we should briefly refer to a few of the many diseases to which he is liable.

EPIZOOTIC INFLUENZA.

From time immemorial this disease has continued to infect the equine race; ranging over more or less area, but generally in the form of enzootic. Until October, 1872, it did not assume a serious aspect. We quote from a report rendered by Professor Liautard to the State Board of Health of New York city:

"On the evening of October 21st only a few animals were affected, but on the morning of the 22d there was scarcely an animal of the equine species that was not affected. Horses, mules and even a zebra. More than twenty thousand were suffering in different degrees, and it became apparent that the disease was influenza of the catarrhal form, fortunately not serious or fatal."

The symptoms as presented were, with a few exceptional cases, rigors, febrile action, impaired appetite, sneezing, cough, nasal discharge, accelerated respiration, weak and compressable pulse, and dry fæces. The attack was very sudden; the animal would be apparently well in the evening and sick in the morning; there was an abundant discharge from the nose; the temperature per rectum was often as high as 105° Fah., loss of appetite being one of the premonitory symptoms, and the movements of the animal were feeble and staggering. The skin was dry and the hair dull and staring.

The duration of the mild form is from two to three weeks, after which the animal can resume work, though in a few cases the symptoms disappear in eight or ten days.

The most common complications were thoracic pleurisy and pneumonia, destroying a large number of animals. The nervous system was affected in a few cases, in the form of spinal meningitis; in these the result proved quite satisfactory."

Influenza being debilitating in its nature, the animals which succumbed to the disease, did so from exhaustion, induced by the excessive work to which they were subjected, or from complications. Occasionally a relapse would occur, due to unfavorable atmospheric changes.

TREATMENT.

This is very simple, requiring merely close attention to the hygiene and diet, which should consist principally of laxatives, nutritious food, combined with vegetable tonics. But where complications follow, such as purpura, hæmorrhagica, adenitis, cerebro spinal meningitis, &c., the services of the veterinarian are required.

GLANDERS OR FARCY

Are widely diffused diseases, and it is questionable if there is a country on the face of the globe where it does not exist in a greater or less degree. Fleming says "that the designation, glanders and farcy, are employed to distinguish two forms of one disease, and that they are two diseases essentially identical, however dissimilar their external manifestations." The term glanders is applied where the disease affects the nasal, respiratory mucous membranes, lymphatic glands and lungs. Farcy, when it affects the skin and sub-cutaneous connective tissue. This fact has been demonstrated by inoculation, as the form of the disease does not depend at all upon the source from which the virus may be taken; for illustration, a subject may be inoculated with virus taken from a case of farcy, and a case of glanders will be induced, with the characteristic glandular enlargment and ulcerated mucous membranes, and *vice versa*.

A good deal of controversy has from time to time been indulged in as to its origin; some authorities claiming it is induced only by inoculation, while others are equally as positive it has spontaneous origin. We coincide with the latter view.

There are several cases on record where a number of animals have during a long, cold, wet spell of weather suddenly developed the malady in all its virulence, when to all appearances the animals were prior to it in excellent health. Owing to the

vitality of the virus, too much care cannot be exercised in thoroughly cleansing and disinfecting all places where glanderous animals may have been kept, it being important that another animal should not occupy the stall or box for the period of six months afterward. All suspected cases should at once be examined by a competent person and if found suffering from the malady, destroyed without delay, and their bodies buried deeply, as all animals are liable to contract the disease, and dogs especially.

The disease is one that should be handled with extreme caution. We cannot undertake to give all the characteristic changes and symptoms so essential to be known in order to detect the malady in the brief space allotted us.

It has been ably discoursed upon in a number of excellent works, which are easily procured.

From the frequency in which we meet with cases, we may draw the conclusion that it prevails to a greater or less extent in all parts of the country. Scarcely a week passes that we are not called upon to see one or more cases, in which we feel it our duty to order occision. We are in communication with a number of practitioners from various parts of the State, who inform us that it has grown to be quite common in their practice. This with other reasons inclines us to believe that it is on the increase, and so long as unscrupulous dealers are allowed to dispose of infected animals with impunity, we cannot expect a different state of affairs.

A law such as has recently been passed in New York, making it a misdemeanor, and punishable with a fine and imprisonment for any person who shall dispose of an animal suffering with glanders, would have a salutary effect in our State.

Dr. Dutan, of Morristown, reports the appearance of an enzootic in Madison, N. J., last Spring, where a number of cases died of a disease resembling diphtheria in the human subject.

A consulting veterinarian surgeon from New York, an excellent authority, differed in his diagnosis, and thought it resembled cerebro spinal-meningitis under a slightly changed form. Not having an opportunity to see enough of the cases we are not prepared to discuss the subject, though we are inclined to think it might have been anthroid angina.

Dr. J. C. Force reports an unusual number of cases of angina

of a mild form, and readily yielding to treatment. Our attention having been called in New Brunswick, Paterson, Princeton, Roselle and Raritan, in our professional capacity to examine what was believed to be a form of influenza. We had little or no difficulty in detecting glanders, and caused a number of cases to be destroyed.

TYPHOID INFLUENZA.

Has been more or less prevalent in and about Newark, N. J., for the last year, and quite a number of cases have died from its effects. We may account for the great number of cases presenting typhoid characters, from the fact that many stables are so constructed that the urine, with other drainage, often lies directly under the animal.

Fermentation is set up and they are compelled to breathe an atmosphere loaded with effluvium; hence the disease. We would endeavor to impress upon horse owners the importance of raising the flooring of such stables, and thoroughly cleaning and disinfecting that part. We feel satisfied the result gained would amply repay the time and trouble. Other diseases and those of other animals will be more fully treated at another time.

Report on Interrupted Water Supply.

Report of the Committee appointed by the New Jersey State ›ard of Health as to an alleged nuisance at New Village, arren county, pursuant to a petition herewith attached:

Having visited New Village on January 3rd, 1878, find it con-ins thirty-four families, one school, two blacksmith shops, one achine shop, one wheelwright shop, one store, one shoe shop, e hotel, and about two hundred inhabitants. The conditions ›w and formerly of the water supply to said village, together to the alleged nuisance, are as follows, viz:

1st. Prior to 1831 the village was supplied with water by eans of a good sized mountain brook running through it, well gging being impracticable, as water could not be obtained ›m that source.

2nd. In 1831 the Morris Canal was constructed at the base of e mountains across the brook supplying the village with water, e Canal Company placing a tube of four inches in diameter ıder the canal for the purpose of giving the necessary supply. ıe village *at that time*, contained only six or seven fami-s and no business places. The balance of water went into the nal.

3rd. In 1845 the canal was enlarged, by which operation the ur inch tube became clogged and partially stopped. The citi-ns of the village could not get any satisfaction from the Canal ›mpany, and the suffering was so great that a number of persons nt in the night and dug the canal through, giving them all e original brook, in which act it does seem as if they were most justifiable. Afterwards on account of the increase of habitants, the Canal Company in addition to the four inch be, put in a two inch lead pipe, but for some time the four h tube has been completely clogged, no water going through and the two inch pipe partially, so that in dry times no water all gets to the village, and when it does get there is so impure ıt cattle will not drink it, the sanitary effect of which can

easily be understood; *i. e.*, the suffering of the inhabitants from sickness and distress from that cause for the past two years has been serious. The head of the two inch pipe had just been cleared when we saw it, but we understand that since that time it has become clogged.

The whole fixture of the two-inch pipe is of the most temporary character—has the appearance of having been placed in by unskilled labor—taking water from the canal instead of from the brook, and arranged in such a manner that it is constantly subject to stoppage. It is certainly surprising that such an arrangement exists when the expense would be trifling and very little skill is required to make a permanent and complete arrangement by taking the water from the brook laterally and above level of the canal, giving a six inch diameter pipe, which would need but little attention afterwards, and give an abundant supply of pure and wholesome water to the village for years to come.

The canal company, in 1831, considered a tube of four inches diameter necessary to supply six or seven families, and now when there are thirty-four families and a number of business places, it undertakes to give the needed supply through a two-inch pipe, and that clogged up part of the time. The cutting off of water from this village seems to be an outrage and nuisance which should be brought properly before the canal company and abated at once.

This case seems to call for an expression from this Board, and we would add that in all cases (especially when it is used for drinking purposes,) when the supply is interfered with, or polluted so as to endanger the health of a community, there should be some way of remedying the evil by summary process, and when the nuisance is permitted, or committed by any corporation, it should be abated by the Board of Health in such place, and the charges and costs be made a preferred lien over any other existing indebtedness. When a whole community is suffering from the neglect or carelessness of an incorporation it should certainly be reached in a shorter manner than the tedious process of the present law. We would therefore recommend the attention of the Committee on Legislation to this subject.

All of which is respectfully submitted,

THEODORE R. VARICK,
EZRA A. OSBORN.

Meteorological Records.

No. 1.—Showing Mean Temperature at Cape May, N. J., for 1878. Latitude, 38° 56′; Longitude, 74° 58′.

Days.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.........	30.7	33.5	41.7	48.2	61.0	56.0	73.2	74.0	78.2	67.2	45.	48.
2.........	38.5	32,	48.7	49.7	64.5	57.5	73.2	75.0	79.	69.7	53.5	54.7
3.........	21.2	29	50.5	49.5	65.0	61.5	74.0	75.7	77.2	69.7	43.5	47.
4.........	40.2	31.	40.2	46.2	64.7	64.7	74.7	75.2	74.7	67.2	41.	47.2
5.........	28.7	35.2	42.	50.7	59.0	67.0	77.7	75.2	73.7	61.0	43.7	37.
6.........	26.5	39.2	49.7	50.5	62.0	61.7	76.0	75.2	72.5	61.7	53.	47.
7.........	20.0	46.	54.5	50.5	62.5	62.0	76.7	74.5	71.0	57.7	42.	38.
8.........	31.5	50.5	52.5	52.5	67.0	64.2	75.2	75.5	67.7	62.5	40.7	38.
9.........	42.2	49.2	50.2	51.5	62.7	66.5	76.0	79.0	68.7	71.5	41.5	49.5
10.........	44.2	43.2	51.7	55.	61.2	64.7	76.2	77.7	74.2	60.5	47.5	49.5
11.........	41.0	32.5	52.2	55.7	52.2	60.2	77.7	72.0	73.2	59.0	52.2	42.2
12.........	39.5	37.5	45.7	55.5	51.2	63.7	72.7	73.2	75.5	58.5	52.	39.5
13.........	43.7	41.7	51.2	54.7	51.2	64.5	73.7	73.2	74.7	58.5	58.	36.7
14.........	44.	39.2	47.7	56.	50.0	66.5	73.7	75.0	68.0	64.7	41.	41.2
15.........	39.2	38.2	45.	52.	46.0	67.0	79.0	72.2	67.0	65.0	42.5	40.2
16.........	31.2	41.7	48.2	47.5	55.0	67.2	73.5	71.7	66.0	67.5	57.5	30.7
17.........	38.7	46.	45.7	49.5	56.5	73.0	73.5	72.5	68.2	67.5	57.5	32.
18.........	40.5	35.7	45.2	52.2	57.7	65.5	79.5	76.2	73.7	53.0	48.	34.5
19.........	45.5	31.5	49.	55.	61.5	68.0	81.7	76.0	75.5	51.7	55.5	30.5
20.........	48.7	45.2	47.7	59.5	56.7	70.5	78.7	75.7	74.5	55.7	49.2	29.7
21.........	46.5	49.7	46.7	63.	65.2	70.5	77.5	71.5	75.7	59.7	53.7	43.
22.........	45.	51.	48.5	59.5	59.7	70.2	74.7	69.7	63.2	62.5	57.7	38.2
23.........	29.	49.7	51.7	64.5	62.0	68.2	76.0	66.5	64.0	63.5	44.2	27.5
24.........	34.2	41.7	44.7	60.7	62.5	72.0	77.7	71.2	70.5	55.5	50.0	25.
25.........	46.7	39.7	30.5	58.2	65.0	72.7	74.7	70.5	70.7	53.2	54.7	22.2
26.........	46.5	38.2	41.7	60.5	67.2	76.5	73.7	70.2	70.5	56.7	42.	29.7
27.........	46.5	44.	53.2	59.7	67.7	76,7	76.0	72.0	57.0	61.7	52.7	25.5
28.........	35.2	46.7	53.7	59.2	69.2	77.2	77.2	73.5	55.0	44.7	45.7	26.2
29.........	26.0	....	46.7	59.7	66.5	75.5	74.2	73.5	65.0	47.7	45.2	28.
30.........	30.8	....	48.2	59.5	63.7	74.5	72.5	74.7	62.7	59.5	42.5	32.
31.........	42.2	....	47.5	....	55.2	....	71.5	75.5	....	46.5	....	29 7

No. 2.—Barometer reduced to 32° at Cape May, N. J., for 1878.

Days.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.........	29.85	29.81	30,43	29.76	29.98	29.99	30.09	29.90	30.059	30.113	30.176	30.306
2.........	29.89	30.22	30.07	28.78	29.80	29.99	30.08	29.78	30.032	30.001	30.104	24.646
3.........	30.39	30.23	29.40	29.80	29.86	29.99	30.13	29.84	29.980	30.03	30.268	24.746
4.........	29.75	29.94	29.74	29.43	29.82	29.94	30.09	29.88	29.935	30.028	30.228	29.559
5.........	29.44	30.07	30.31	29.32	29.75	29.95	29.92	29.91	29.956	30.035	30.271	29.841
6.........	30 18	30.26	30.24	29.39	29.86	30.05	29.97	29.78	30.093	30.139	29.901	30.015
7.........	30.51	30.11	30.06	29.71	29.91	29.96	30.04	29.86	30.29	30.24	29.297	30.181
8.........	30.72	29.52	30.39	30.63	29.78	29.62	30.02	29.91	30.285	30.227	29.718	30.394
9.........	30.38	29.66	30.47	30.23	29.88	29.74	30.03	29.71	30.176	29.984	29.984	29.945
10.........	29.63	29.51	30.24	28.98	29.93	29.60	30.08	29.83	30.049	30.047	29.968	28.998
11.........	29.65	29.87	30.10	29.64	29.94	29.84	30.17	29.91	30.033	29.934	29.726	29.835
12.........	30.17	30.04	29.88	29.61	30.01	30.03	30.09	29.98	29.94	29.895	29.728	30.388
13....	30.16	29.98	29.72	29.72	30.05	30.14	30.02	29.98	29.863	30.123	29.973	30.399
14.........	29.71	29.95	29.87	29.86	30.04	30.18	29.94	29.96	30.109	30.206	30.407	30.153
15.........	29.68	29.99	30.08	29.99	29.92	30.08	29.95	30.11	30.207	30.153	30.495	29.818
16.........	30.18	30.04	30.05	30.16	30.00	30.00	30.08	30.17	30.27	30.141	30.353	30.152
17.........	30.24	29.92	29.80	30.22	30.06	29.95	30.00	30.06	30.241	30.023	30.083	30.175
18.........	30.33	30.02	29.95	30.26	30.19	29.91	29.89	29.93	30.160	29.731	29.972	30.217
19.........	30.30	30.28	29.99	30.04	30.24	29.91	29.86	29.78	30.120	29.851	29.926	30.443
20.........	30.07	30.08	30.03	29.84	30.10	29.87	29.90	29.74	30.033	30.129	29.824	30.445
21.........	29.85	29.94	30.17	29.86	29.96	29.79	29.68	29.83	29.987	30.222	29.782	29.624
22.........	29.80	29.61	30.17	30.03	30.08	29.72	29.79	30.03	30.282	30.026	29.045	29.737
23.........	30.12	29.76	29.76	29.98	30.09	29.91	30.03	30.17	30.392	29.499	29.576	30.046
24.........	30.45	29.95	29.41	29.90	29.97	29.92	30.07	30.06	30.247	30.132	29.986	30.027
25.........	30.31	29.99	29.90	29.74	29.83	29.96	29.96	29.80	30.204	30.314	29.916	30.147
26.........	30.06	30.11	30.05	29.77	29.67	30.08	29.81	29.97	30.166	30.324	30.225	29.967
27.........	30.00	30.11	29.81	29.84	29.80	30.11	29.85	29.95	30.364	30.074	29.728	29.808
28.........	29.77	30.06	29.62	29.72	29.88	30.12	30.08	29.98	30.363	30.214	29.821	30.222
29.........	30.25	....	29.94	29.74	30.03	30.10	30.05	30.06	30.256	30.189	30.219	30.326
30.........	30.42	....	30.14	29.89	29.93	30.11	29.90	30.14	30.191	29.824	30.343	30.212
31.........	29.66	....	29.80	....	29.91	....	29.99	30.14	....	29.813	....	30.374
	30.370	29.97	29.99	29.84	29.95	29.95	29.98	29.94	30.143	30,054	29.993	....

No. 3.—Inches of Rain and Melted Snow for 1878, at Cape May, New Jersey.

Days.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1		.05 *				.55 .70			.13			
2						.05 .03						.95
3			.05			.01						
4	1.24								.80			13 .09
5			*		1.30				.02			.01
6												
7			.02							.05	.04	
8	*				.02	.15 .01						
9				.02	.02	.06	.02					.02 .02
10	.90	.22 .20		.40		.15 .50			.08			2.31
11	.14		.64 .03	.02 .06		.10				.04		.22
12			.73	.30 .02		.01	.04 .73				.22	
13			.75 Th.05		.32	.08	.07		.03 .11			
14	.13		.15									
15					2.71							
16				.01								1.44
17		.06	.48		.12						.03	
18		.03				.62				.10 .36	.37	
19							.01					
20	.21			.04	.50						.20	
21				.03	.30		.25					1.74
22	.01	.07				1.05					.35	
23										2.28		
24			.08									
25	.01			.70								
26	.16				.10				.16			
27	.02										1.90	.05
28	.02		.35	.02							.06	
29				.03								
30					.71		.52 .79			.14		.02
31	2.09		.83 .01		.01					.41		
	5.02	.63	3.61	2.06	6.11	4.07	2.43	6.41	1.33	3.38	3.17	7.00

* Too small to measure.

No. 4.—Direction of Wind at Cape May, N. J., 1878.

DATE.	JANUARY. 7 A. M.	JANUARY. 2 P. M.	JANUARY. 9 P. M.	FEBRUARY. 7 A. M.	FEBRUARY. 2 P. M.	FEBRUARY. 9 P. M.	MARCH. 7 A. M.	MARCH. 2 P. M.	MARCH. 9 P. M.
1...	N. W.	N. W.	N. W.	W. 6	N. W. 4	N. 2	N. 2	E. 4	E. 2
2...	N. W.	S.	W.	N. 2	N. 2	N. 2	S. E. 2	S. E. 2	S. 6
3...	N. W.	N. W.	N. E.	N. 2	N. 2	N. W. 2	S. 4	S. 4	S. 2
4...	E.	S.	W.	N. 2	N. W. 4	N. W. 4	W. 6	S. W. 6	N. W. 6
5...	W.	W.	W.	N. 4	N. 4	N. W 4	N. W. 4	N. W. 4	S. 2
6...	W.	W.	W.	N. W. 4	N. W. 2	S. W. 2	S. 4	S. 4	S. 4
7...	N. W.	N. W.	N. W.	S. W. 4	S. 4	S. E. 2	S. W. 4	S. W. 4	N. W. 4
8...	N.	S.	....	S. E. 4	S. E. 2	S. 4	N. E. 2	S. 2	S. 2
9...	N. E.	N. E.	E.	S. W. 4	N. W. 2	S. E. 2	E. 2	S. E. 2	S. E. 2
10...	E.	N. E.	N. W.	S. W. 4	N. W. 2	W. 2	E. 2	S. E. 2	S. 2
11...	W.	W.	W.	N. W. 6	N. W. 6	N. 4	S. 2	S. 2	N. E. 2
12...	W.	W.	W.	N. 4	S. W. 2	S. 6	N. E. 4	N. E. 4	N. E. 4
13...	N.	E.	E.	W. 2	S. W. 2	E. 2	W. 2	S. W. 2	S. W. 4
14...	S. W.	S. W.	S. W.	E. 4	E. 4	E. 4	S. W. 4	W. 6	N. W. 2
15...	W.	N. W.	N. W.	N. E. 2	E. 4	E. 2	N. 4	N. W. 4	N. W. 2
16...	N. W.	N. W.	N.	N. 2	S. 2	S. W. 4	N. 2	S. 2	S. E. 2
17...	N. E.	S. E.	S.	S. W. 4	S. 4	S. 4	S. E. 4	N. W. 4	N. 4
18...	N.	E.	E.	N. 4	N. 4	N. 6	N. W. 6	N. 4	N. 4
19...	E.	S. E.	S. E.	N. 4	N. W. 2	S. 4	N. W. 4	N. W. 2	N. W. 2
20...	S. E.	S. E.	S. E.	S. 6	S. 4	S. 4	N. W. 2	N. W. 6	N. W. 4
21...	N. W.	S. E.	N. W.	S. 4	S. 4	S. 4	E. 2	S. 2	S. 2
22...	W.	W.	W.	S. E. 4	S. 4	S. 4	N. E. 2	S. E. 2	S. 4
23...	W.	W.	N. W.	....	E. 2	N. 2	S. W. 4	S. 6	S. 4
24...	N. W.	S. E.	S.	N. W. 4	N. W. 4	N. W. 2	S. 4	W. 4	N. W. 8
25...	S.	S.	S.	N. 4	N. W. 4	W. 6	N. W. 6	N. W. 6	W. 6
26...	W.	W.	N.	N. W. 8	N. W. 8	N. W. 4	N. W. 6	N. W. 2	S. W. 2
27...	....	S. E.	S.	N. W. 6	N. W. 4	S. W. 2	S. 4	S. 2	S. 4
28...	W.	N. W.	N.	W. 2	N. W. 2	S. 2	S. 4	S. 4	S. 4
29...	N.	N.	N.	....	....	....	N. 6	N. W. 4	N. 4
30...	N.	E.	E.	....	....	....	N. 4	S. E. 2	S. 4
31...	S. E.	E.	N. E.	....	....	....	E. 2	E. 2	S. W. 2

No. 4.—(Continued.)

DATE.	APRIL. 7 A. M.	APRIL. 2 P. M.	APRIL. 9 P. M.	MAY. 7 A. M.	MAY. 2 P. M.	MAY. 9 P. M.	JUNE. 7 A. M.	JUNE. 2 P. M.	JUNE. 9 P. M.
1...	W. 4	N. W. 4	N. W. 2	E. 2	S. 2	S. 2	N. E. 4	N. E. 4	N. E. 4
2...	N. W. 4	N. W. 2	W. 2	W. 2	S. E. 2	S. 4	N. E. 4	N. E. 2	N. E. 2
3...	E. 2	S. E. 2	S. E. 2	S. 2	S. 4	S. 4	N. E. 2	E. 2	E. 2
4...	N. E. 2	N. E. 4	N. 2	S. 4	S. 4	S. 4	S. E. 2	S. E. 2	S. E. 2
5...	N. W. 6	N. W. 4	W. 4	S. 4	W. 4	W. 2	W. 2	N. W. 2	N. 6
6...	N. W. 4	W. 2	W. 4	N. W. 2	N. W. 2	N. W. 2	N. 4	N. W. 4	N. W. 2
7...	N. W. 6	N. W. 4	N. W. 2	S. W. 2	S. 4	S. 2	N. E. 2	S. E. 2	S. E. 2
8...	N. W. 4	N. W. 2	S. 2	N. W. 2	S. 2	E. 2	S. E. 2	S. 4	S. 2
9...	E. 2	S. E. 4	S. E. 2	S. E. 2	N. 2	E. 2	W. 4	N. W. 2	S. E. 2
10...	S. E. 2	S. E. 4	S. E. 2	N. 2	S. W. 2	N. W. 4	S. 4	N. 2	E. 2
11...	N. E. 2	N. W. 2	S. W. 2	N. W.	N. W. 4	N. W. 6	N. 4	N. W. 2	S. W. 2
12...	N. W. 4	W. 4	W. 2	N. W.	S. W. 4	S. W. 2	N. W. 4	N. W. 2	S. 2
13...	W. 4	N. W. 4	N. W. 2	N. 4	N. W. 2	N. 2	N. 2	N. W. 2	S. E. 2
14...	N. W. 2	N. W. 2	W. 2	E. 2	E. 2	E. 2	N. 2	S. 2	S. E. 2
15...	E. 2	E. 2	E. 2	N. E. 6	N. E. 4	N. 2	N. W. 2	S. 2	S. 4
16...	E. 2	E. 2	N. E. 2	N. 6	N. W. 2	S. W. 2	S. W. 2	S. 4	S. 4
17...	N. E. 2	E. 2	E. 2	S. W. 2	S. 2	S. E. 2	S. 4	S. 2	N. 2
18...	N. E. 2	S. E. 2	S. E. 2	N. E. 2	W. 2	S. 2	S. W. 2	S. 2	N. 2
19...	W. 2	S. 2	S. 2	S. W. 2	S. E. 2	S. E. 2	N. 2	S. E. 2	....
20...	S. 2	S. 2	S. 2	S. E. 2	S. E. 2	S. W. 4	W. 2	N. W. 2	S. 2
21...	W. 2	W. 2	N. W. 2	S. E. 2	S. 2	S. W. 2	S. 2	S. 2	S. E. 2
22...	S. E. 2	S. E. 2	S. E. 4	N. 4	N. W. 4	N. W. 2	S. E. 2	S. 2	N. W. 2
23...	S. E. 2	E. 2	S. 4	N. 4	N. W. 2	N. W. 2	W. 2	W. 2	W. 2
24...	S. 2	S. 6	S. 4	N. 2	S. E. 2	S. E. 2	W. 2	W. 2	S. W. 2
25...	S. 2	S. 2	S. E. 2	S. 2	S. 2	S. 2	W. 2	N. W. 2	S. 2
26...	S. E. 2	S. E. 2	S. 4	S. 2	W. 2	W. 2	W. 2	S. 2	W. 2
27...	S. E. 2	S. E. 2	S. 2	W. 2	N. W. 2	S. 2	S. 2	S. 2	S. 2
28...	N. E. 2	E. 2	E. 2	W. 2	N. W. 2	W. 2	N. W. 2	W. 2	S. 2
29...	S. 2	S. E. 2	S. 2	N. E. 2	N. 2	S. W. 2	N. W. 2	S. 2	S. E. 2
30...	S. E. 2	E. 2	E. 2	S. E. 2	S. 2	N. 2	E. 2	S. E. 2	S. E. 2
31...	....	....	....	N.	N. 4	N. E. 4	....	....	....

Figures along side denote as follows: Breeze, (2); strong wind, (4); gale, (6); violent gale, (8); tornado, (10).

No. 4.—(Continued.)

Date.	July. 7 A. M.	July. 2 P. M.	July. 9 P. M.	August. 7 A. M.	August. 2 P. M.	August. 9 P. M.	September. 7 A. M.	September. 2 P. M.	September. 9 P. M.
1...	E. 2	S. E. 2	S. E. 2	E. 2	S. E. 2	E. 2	S. 2	S. E. 2	S. 2
2...	S. E. 2	S. E. 2	S. 2	W. 2	N. W. 2	S. 2	S. 2	S. 2	S. 2
3...	S. 2	S. 2	S. 2	N. W. 2	W. 2	S. 2	S. E. 2	S. E. 2	S. 2
4...	S. 2	S. 2	S. 2	S. 2	S. 2	S. 2	S. 2	E. 2	N. W. 2
5...	W. 2	N. W. 2	E. 2	S. E. 2	S. E. 2	S. E. 2	N. 2	N. W. 2	N. W. 2
6...	N. E. 2	S. E. 2	S. 2	S. E. 2	S. E. 2	N. 4	N. 2	E. 2	E. 2
7...	S. 2	S. E. 2	S. E. 2	W. 2	N. W. 2	S. W. 2	N. E. 2	E. 4	N. E. 2
8...	S. E. 2	S. 4	S. 2	N. W. 2	S. 2	S. 2	N. E. 2	N. E. 2	N. E. 2
9...	S. 2	S. 4	N. W. 2	S. 2	S. 2	S. W. 2	N. E. 2	N. E. 2	N. E. 2
10...	S. 2	S. 2	S. 2	N. E. 2	S. E. 2	S. 2	N. E. 2	E. 2	E. 2
11...	E. 2	E. 2	S. E. 2	W. 2	S. W. 2	S. W. 2	E. 2	E. 2	N. E. 2
12...	N. E. 2	S. E. 2	S. E. 2	N. 2	N. W. 2	S. 2	E. 2	E. 2	E. 4
13...	N. 2	N. E. 2	S. E. 2	S. E. 2	S. E. 2	E. 2	S. E. 4	S. 4	W. 4
14...	S. E. 2	S. 2	S. 2	N. E. 2	E. 2	E. 2	N. 4	N. W. 2	W. 4
15...	W. 2	S. W. 2	S. E. 2	E. 2	S. E. 2	S. 2	N. 4	N. W. 4	N. 2
16...	N. E. 2	S. E. 2	E. 2	S. 2	S. 2	S. 2	N. E. 2	E. 2	E. 2
17...	S. E. 2	S. E. 2	S. 4	S. E. 2	S. 4	S. E. 2	E. 2	N. W. 2	S. 2
18...	S. 2	S. 2	S. 2	S. W. 2	N. W. 2	N. W. 2	S. W. 2	S. W. 2	S. W. 2
19...	S. W. 2	N. W. 2	W. 2	S. W. 2	S. E. 2	S. 2	W. 2	S. E. 2	S. W. 2
20...	N. W. 2	E. 2	S. E. 2	N. W. 2	N. W. 2	N. W. 2	S. 4	S. 4	S. 4
21...	S. 2	S. E. 2	W. 4	N. 4	N. W. 2	N. 2	S. 4	S. W. 2	S. W. 2
22...	N. W. 4	N. W. 4	N. 2	N. 2	N. E. 2	E. 2	N. 4	N. 2	N. E. 2
23...	N. W. 4	W. 2	W. 2	N. E. 2	N. E. 2	E. 2	N. E. 2	N. E. 2	S. E. 2
24...	....	S. 2	S. 2	N. E. 2	S. E. 2	S. 2	S. E. 2	S. E. 2	S. E. 2
25...	S. W. 2	S.	S. 2	S. 4	N. W. 4	N. 2	N. E. 2	N. 2	S. 2
26...	S. 4	S.	S. 4	N. 2	S. E. 2	S. 2	S. W. 2	W. 2	N. 2
27...	S. 4	W. 2	....	S. 2	S.	S. E. 2	N. 4	N. 2	N. E. 2
28...	N. E. 2	S. E. 2	S. E. 2	E. 2	S. E.	S. E. 2	N. 2	E. 2	N. E. 2
29...	S. E. 2	S. E. 2	S. E. 2	E. 2	S. E. 2	S. E. 2	E. 2	S. E. 2	E. 2
30...	S. W. 2	S. 2	N. 2	E. 2	S. E. 2	S. E. 2	N. E. 2	N. E. 2	N. E. 2
31...	N. E. 2	S. E. 2	E. 2	S. E. 2	S. E. 2	S. E. 2	....	....	....

No. 4.—(Concluded.)

Date.	October. 7 A. M.	October. 2 P. M.	October. 9 P. M.	November. 7. A. M.	November. 2 P. M.	November. 9 P. M.	December. 7 A. M.	December. 2 P. M.	December. 9 P. M.
1...	N. E. 2	E. 2	E. 2	N. W. 8	W. 4	S. W. 4	N. E. 2	E. 2	E. 4
2...	....	S. E. 2	S. 2	S. W. 6	S. W. 2	S. W. 4	S. E. 6	S. W. 4	W. 4
3...	....	N. W. 2	S. E. 2	N. 4	N. 4	N. 2	W. 4	W. 4	S. 4
4...	N. 2	N. W. 2	N. 2	N. W. 2	N. W. 4	N. W. 2	W. 4	W. 2	N. W. 4
5...	N. 4	N. W. 2	S. E. 2	N. W. 4	N. W. 4	W. 4	N. W. 6	N. W. 6	N. W. 6
6...	N. W. 4	N. W. 2	N. 4	S. W. 4	S. W. 4	N. W. 2	W. 4	W. 6	N. W. 4
7...	N. E. 2	S. 2	S. W. 2	N. 2	N. 2	W. 4	W. 4	N. W. 4	N. W. 4
8...	N. W. 2	W. 2	S. 2	W. 6	N. W. 6	N. 6	N. 2	N. 2	S. E. 2
9...	S. 4	S. W. 6	S. W. 6	N. W. 6	N. W. 6	N. W. 6	S. E. 2	S. E. 4	S. E. 4
10...	N. 4	N. W. 4	N. 2	W. 6	N. W. 4	N. W. 2	S. E. 6	S. W. 4	S. W. 6
11...	N. E. 2	N. E. 4	N. E. 4	E. 2	S. 2	S. 4	W. 6	W. 6	W. 2
12...	N. 4	N. 6	N. 6	S. W. 2	N. W. 4	N. W. 2	N. W. 4	N. W. 4	N. 4
13...	N. 6	N. 4	N. W. 2	N. 2	N. 4	N. W. 4	N. W. 4	N. W. 4	N. W. 2
14...	N. W. 2	S. E. 2	S. 4	N. 4	N. W. 2	N. E. 2	N. E. 2	S. E. 2	S. 4
15...	S. 4	S. 4	S. 4	N. 2	E. 2	E. 2	S. W. 2	N. 2	N. W. 4
16...	S. 4	S. W. 4	S. 4	N. E. 2	E. 2	N. E. 2	W. 6	N. W. 6	N. E. 2
17...	S. 4	S. 4	S. 4	E. 2	S. E. 2	S. E. 2	N. E. 2	N. W. 2	N. W. 2
18...	N. W. 4	N. 4	N. W. 6	N. 2	N. 4	N. 4	N. W. 2	W. 4	N. W. 4
19...	W. 6	N. W. 4	W. 6	N. W. 2	N. 2	S. E. 2	N. W. 2	N. W. 4	N. W. 4
20...	N. W. 6	W. 4	S. W. 4	N. 2	N. E. 2	S. 2	N. W. 4	N. W. 2	W. 2
21...	S. W. 2	S. 2	S. 4	S. E. 2	S. E. 2	E. 4	S. E. 2	S. E. 6	S. 4
22...	S. 2	S. E. 2	E. 4	N. E. 2	S. 4	S. W. 4	W. 6	W. 6	S. W. 4
23...	E. 8	S. W. 4	N. W. 4	W. 8	W. 8	W. 6	W. 6	W. 6	S. W. 4
24...	N. W. 6	N. W. 6	N. W. 4	W. 4	S. 2	S. 2	N. W. 6	W. 6	W. 6*
25...	N. 4	S. E. 2	....	S. 2	S. W. 2	S. 4	W. 6	N. W. 6	N. W. 6
26...	....	S. 2	S. 4	N. 4	N. 2	N. 4	N. W. 4	W. 4	....
27...	S. 4	S. 4	S. 4	E. 4	S. E. 4	S. W. 6	N. 4	N. W. 6	N. W. 6
28...	N. W. 6	N. W. 4	N. 2	W. 4	W. 6	W. 6	W. 4	N. W. 6	N. W. 4
29...	N. 2	S. W. 2	S. E. 2	W. 4	W. 4	S. W. 4	N. W. 4	N. W. 2	S. 4
30...	S. E. 4	W. 2	N. 2	N. W. 4	N. W. 2	N. 2	S. W. 2	N. W. 4	N. W. 4
31...	E. 2	N. W. 6	N. W. 8	....	....	....	N. 2	N. W. 2	N. W. 2

Figures along side denote as follows: Breeze, (2); strong wind, (4); gale, (6); violent gale, (8); tornado, (10).

Maximum, Minimum and Mean Temperatures—Station, Barnegat, New Jersey.

DAY OF MONTH.	1876.												1877.											
	JULY		AUG.		SEPT.		OCT.		NOV.		DEC.		JAN.		FEB.		MAR.		APRIL		MAY		JUNE	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	80	69	71	64	83	62	60	47	62	48	25	16	29	15	52	36	49	31	40	39	55	46	81	61
2	89	68	71	67	77	63	62	47	64	50	25	17	30	15	44	36	49	35	50	40	51	43	83	62
3	93	64	70	67	77	58	64	44	60	46	35	21	22	7	43	35	52	39	43	32	57	40	82	64
4	79	62	78	69	83	55	68	54	56	42	34	22	17	4	41	29	55	35	40	38	63	46	84	65
5	85	62	81	68	70	58	63	51	50	41	36	21	25	7	39	29	37	29	42	37	54	47	68	59
6	89	63	84	68	74	52	72	58	55	42	39	23	39	14	41	30	36	25	54	35	51	44	69	57
7	78	63	86	70	66	59	60	45	55	50	45	27	44	33	50	30	55	33	57	35	59	43	72	58
8	90	65	84	68	77	63	60	40	53	47	40	27	39	28	39	28	49	39	43	32	52	47	76	60
9	95	72	81	68	73	62	51	42	52	45	39	8	29	14	34	25	52	29	42	39	48	45	72	62
10	84	70	80	70	67	62	65	40	48	39	18	4	35	24	40	30	32	23	44	37	51	44	73	60
11	83	70	80	61	64	57	56	40	48	39	34	17	33	13	42	27	40	21	52	35	53	44	62	54
12	92	66	83	71	68	58	51	36	51	37	34	26	34	29	49	32	44	35	52	39	57	44	64	52
13	87	75	82	74	71	60	57	33	62	39	44	27	34	24	33	20	44	37	45	38	62	43	69	60
14	88	71	81	74	73	65	63	42	65	48	47	33	32	22	37	16	40	35	43	39	72	49	73	60
15	84	73	93	69	75	62	53	28	51	44	43	23	36	29	38	23	38	26	49	34	75	53	74	57
16	82	68	81	72	66	60	50	29	45	39	42	11	48	34	44	28	39	26	54	38	67	54	70	60
17	85	64	80	73	73	60	58	39	51	39	29	7	34	26	41	28	42	23	53	43	79	59	78	59
18	86	68	76	71	74	64	52	36	53	48	43	17	36	25	38	24	29	17	46	44	86	60	74	61
19	81	64	76	71	75	60	58	38	54	50	28	10	44	32	36	22	29	14	52	43	84	62	85	62
20	78	63	84	66	69	59	60	48	54	46	23	13	48	34	34	18	32	20	59	46	77	58	74	60
21	84	69	73	58	65	60	59	56	49	43	30	18	40	27	49	26	49	32	54	40	64	56	74	60
22	76	63	79	57	63	59	58	55	49	44	39	14	30	25	58	31	45	39	52	40	79	57	72	59
23	84	65	77	62	66	61	60	55	46	39	38	22	32	20	44	32	50	39	64	40	72	56	68	56
24	76	59	80	71	65	62	63	51	43	34	24	19	31	17	40	34	49	35	65	45	56	48	71	57
25	81	58	82	71	63	58	54	40	41	33	37	18	26	12	44	34	42	40	68	49	61	47	80	60
26	81	58	77	67	67	55	50	37	39	34	38	32	34	17	38	33	49	39	62	44	60	49	84	63
27	82	61	76	61	63	46	48	39	40	31	34	25	48	26	39	30	48	40	57	48	61	48	69	58
28	81	66	77	59	66	45	53	38	42	31	32	22	34	29	45	30	40	31	43	47	64	46	71	60
29	85	68	76	61	69	52	46	40	42	29	48	31	40	29	....	....	35	30	51	47	67	52	71	60
30	77	66	86	67	59	53	50	37	34	24	34	22	37	27	....	....	49	33	52	45	69	51	75	61
31	72	64	75	66	....	....	58	43	....	....	28	17	38	24	....	....	44	32	....	....	80	56	....	....
Range	37°		36°		38°		44°		41°		44°		44°		42°		41°		36°		46°		33°	
Mo'ly means	74°.3		73°.3		64°.5		50°.6		45°.5		27°		28°.6		34°.8		37°.1		45°.6		56°.3		65°.5	

Maximum, Minimum and Mean Temperatures—Station, Sandy Hook, New Jersey.

DAY OF MONTH.	1876.												1877.											
	JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.		JAN.		FEB.		MAR.		APR.		MAY.		JUNE.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	**Max.**	**Min.**
1	80	69	77	64	87	67	60	49	65	49	23	16	25	16	51	37	46	33	48	36	60	48	**85**	**64**
2	94	75	73	66	76	66	61	49	70	55	27	18	24	20	46	37	51	36	49	38	53	43	**87**	**63**
3	87	77	73	65	74	60	65	52	64	50	35	26	23	11	40	36	51	41	48	33	58	40	**87**	**66**
4	94	74	78	67	79	60	63	55	56	46	35	28	20	8	41	34	48	33	43	38	61	47	**79**	**66**
5	89	74	84	67	70	58	56	51	51	46	35	25	24	11	42	31	39	28	44	36	56	46	**73**	**66**
6	86	72	90	70	74	57	72	55	54	44	39	26	36	18	40	33	42	26	51	39	57	46	**71**	**62**
7	88	69	93	73	69	61	67	48	56	49	42	33	45	36	41	31	47	33	53	39	64	55	**68**	**60**
8	100	72	88	74	74	63	58	42	52	46	42	31	42	27	39	32	55	36	50	34	56	44	**78**	**62**
9	97	70	84	70	72	62	53	41	54	45	38	8	28	14	*37	25	55	30	46	38	54	46	**82**	**63**
10	86	68	86	70	67	57	66	49	47	41	19	6	28	18	39	28	31	23	52	39	52	45	**79**	**65**
11	95	72	85	69	62	55	58	42	47	41	26	17	36	18	45	33	45	23	61	40	60	44	**67**	**59**
12	92	71	85	70	68	59	58	39	51	41	36	24	37	20	54	28	48	37	52	38	63	49	**69**	**58**
13	95	74	83	72	70	59	61	42	59	42	49	31	28	20	29	19	41	35	45	37	71	48	**73**	**61**
14	87	75	80	73	75	63	66	45	59	42	47	35	29	21	35	18	40	33	48	38	77	52	**82**	**64**
15	92	73	89	71	73	61	46	33	46	41	42	28	33	25	44	18	37	25	59	39	76	54	**80**	**64**
16	88	70	85	73	65	51	49	35	46	30	37	8	41	30	51	36	36	27	57	39	82	59	**76**	**69**
17	89	69	79	69	72	55	54	42	48	41	22	7	31	24	41	26	36	19	56	43	84	63	**79**	**67**
18	93	73	77	69	73	65	56	39	51	45	34	14	36	26	35	25	27	17	46	43	82	64	**80**	**64**
19	95	72	77	69	71	61	59	43	48	45	26	14	40	32	37	21	27	14	49	42	86	65	**83**	**68**
20	96	72	84	67	68	61	56	47	48	44	23	14	44	36	35	21	33	20	51	45	88	63	**72**	**61**
21	86	73	74	61	65	59	59	55	48	42	23	19	38	24	43	31	56	30	51	42	64	55	**79**	**60**
22	77	68	79	61	61	58	61	55	48	42	36	17	30	24	52	34	56	39	62	42	74	54	**73**	**60**
23	84	68	77	68	63	57	61	56	47	40	34	20	33	23	41	34	56	38	67	44	67	55	**73**	**57**
24	78	62	81	69	63	59	61	53	43	37	24	17	33	16	40	33	58	39	74	48	55	45	**82**	**57**
25	77	61	85	69	65	58	59	45	44	34	28	17	25	16	41	34	42	37	63	50	60	48	**84**	**67**
26	82	63	81	68	65	57	51	42	43	35	33	28	38	21	39	84	46	37	62	46	68	52	**88**	**66**
27	82	64	77	65	60	49	46	41	41	34	33	25	43	31	42	33	48	39	61	49	66	53	**72**	**61**
28	85	67	78	63	64	48	47	40	41	34	30	21	36	28	46	34	40	28	50	46	73	52	**71**	**59**
29	84	68	80	76	72	55	47	37	41	33	42	25	37	31	.....	.....	35	30	59	46	77	54	**71**	**59**
30	70	64	79	67	62	51	54	39	36	23	38	23	39	30	.....	.....	48	33	64	46	79	57	**78**	**60**
31	73	62	80	67	.....	.....	57	49	.....	.....	28	18	43	31	.....	.....	47	35	.....	.....	87	60	.....	.....
Range	39°		32°		39°		39°		47°		43°		37°		36°		44°		41°		48°		**31°**	
Mt'ly means	77°.7		74°.2		63°.9		51°.3		45°.9		27°.3		28°.7		32°.2		37°.4		47°.2		59°.2		**69°.2**	

Maximum, Minimum and Mean Temperatures—Station, Barnegat, New Jersey.

DAY OF MONTH.	1876.												1877.											
	JULY		AUG.		SEPT.		OCT.		NOV.		DEC.		JAN.		FEB.		MAR.		APRIL		MAY		JUNE	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	80	69	71	64	83	62	60	47	62	48	25	16	29	15	52	36	49	31	40	39	55	46	81	61
2	89	68	71	67	77	63	62	47	64	50	25	17	30	15	44	36	49	35	50	40	51	43	83	62
3	93	64	70	67	77	58	64	44	60	46	35	21	22	7	43	35	52	39	43	32	57	40	82	64
4	79	62	78	69	83	55	68	54	56	42	34	22	17	4	41	29	55	35	40	38	63	46	84	65
5	85	62	81	68	70	58	63	51	50	41	36	21	25	7	39	29	37	29	42	37	54	47	68	59
6	89	63	84	68	74	52	72	58	55	42	39	23	39	14	41	30	36	25	54	35	51	44	69	57
7	78	63	86	70	66	59	60	45	55	50	45	27	44	33	50	30	55	33	57	35	59	43	72	58
8	90	65	84	68	77	63	60	40	53	47	40	27	39	28	39	28	49	39	43	32	52	47	76	60
9	95	72	81	68	73	62	51	42	52	45	39	8	29	14	34	25	52	29	42	39	48	45	72	62
10	84	70	80	70	67	62	65	40	48	39	18	4	35	24	40	30	32	23	44	37	51	44	73	60
11	83	70	80	61	64	57	56	40	48	39	34	17	33	13	42	27	40	21	52	35	53	44	62	54
12	92	66	83	71	68	58	51	36	51	37	34	26	34	29	49	32	44	35	52	39	57	44	64	52
13	87	75	82	74	71	60	57	33	62	39	44	27	34	24	33	20	44	37	45	38	62	43	69	60
14	88	71	81	74	73	65	63	42	65	48	47	33	32	22	37	16	40	35	43	39	72	49	73	60
15	84	73	93	69	75	62	53	28	51	44	43	23	36	29	38	23	38	26	49	34	75	53	74	57
16	82	68	81	72	66	60	50	29	45	39	42	11	48	34	44	28	39	26	54	38	67	54	70	60
17	85	64	80	73	73	60	58	39	51	39	29	7	34	26	41	28	42	23	53	43	79	59	78	59
18	86	68	76	71	74	64	52	36	53	48	43	17	36	25	38	24	29	17	46	44	86	60	74	61
19	81	64	76	71	75	60	58	38	54	50	28	10	44	32	36	22	29	14	52	43	84	62	85	62
20	78	63	84	66	69	59	60	48	54	46	23	13	48	34	34	18	32	20	59	46	77	58	74	60
21	84	69	73	58	65	60	59	56	49	43	30	18	40	27	49	26	49	32	54	40	64	56	74	60
22	76	63	79	57	63	59	58	55	49	44	39	14	30	25	58	31	45	39	52	40	79	57	72	59
23	84	65	77	62	66	61	60	55	46	39	38	22	32	20	44	32	50	39	64	40	72	56	68	56
24	76	59	80	71	65	62	63	51	43	34	24	19	31	17	40	34	49	35	65	45	56	48	71	57
25	81	58	82	71	63	58	54	40	41	33	37	18	26	12	44	34	42	40	68	49	61	47	80	60
26	81	58	77	67	67	55	50	37	39	34	38	32	34	17	38	33	49	39	62	44	60	49	84	63
27	82	61	76	61	63	46	48	39	40	31	34	25	48	26	39	30	48	40	57	48	61	48	69	58
28	81	66	77	59	66	45	53	38	42	31	32	22	34	29	45	30	40	31	43	47	64	46	71	60
29	85	68	76	61	69	52	46	40	42	29	48	31	40	29	....	....	35	30	51	47	67	52	71	60
30	77	66	86	67	59	53	50	37	34	24	34	22	37	27	....	....	49	33	52	45	69	51	75	61
31	72	64	75	66	....	....	58	43	....	....	28	17	38	24	....	....	44	32	....	....	80	56	....	....
Range	37°		36°		38°		44°		41°		44°		44°		42°		41°		36°		46°		33°	
Mo'ly means	74°.3		73°.3		64°.5		50°.6		45°.5		27°		28°.6		34°.8		37°.1		45°.6		56°.3		65°.5	

Maximum, Minimum and Mean Temperatures—Station, Sandy Hook, New Jersey.

DAY OF MONTH.	1876.												1877.											
	JULY.		AUG.		SEPT.		OCT.		NOV.		DEC.		JAN.		FEB.		MAR.		APR.		MAY.		JUNE.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	89	69	77	64	87	67	60	49	65	49	23	16	25	16	51	37	46	33	48	36	60	48	85	64
2	94	75	73	66	76	66	61	49	70	55	27	18	24	20	46	37	51	36	49	38	53	43	87	63
3	87	77	73	65	74	60	65	52	64	50	35	26	23	11	40	36	51	41	48	33	58	40	87	66
4	94	74	78	67	79	60	63	55	56	46	35	28	20	8	41	34	48	33	43	38	61	47	79	66
5	89	74	64	67	70	58	56	51	51	46	35	25	24	11	42	31	39	23	44	36	56	46	73	66
6	86	72	90	70	74	57	72	55	54	44	39	26	36	18	40	33	42	26	51	39	57	46	71	62
7	88	69	93	73	69	61	67	48	56	49	42	33	45	36	41	31	47	33	53	39	64	55	68	60
8	100	72	88	74	74	63	58	42	52	46	42	31	42	27	39	32	55	36	50	34	56	44	78	62
9	97	70	84	70	72	62	53	41	54	45	38	8	28	14	•37	25	55	30	46	38	54	46	82	63
10	86	68	86	70	67	57	66	49	47	41	19	6	28	18	39	28	31	23	52	39	52	45	79	65
11	96	72	85	69	62	55	58	42	47	41	26	17	36	18	45	33	45	23	61	40	60	44	67	59
12	92	71	85	70	68	59	58	39	51	41	36	24	37	20	54	28	48	37	52	38	63	49	69	58
13	95	74	83	72	70	59	61	42	59	42	49	31	28	20	29	19	41	35	45	37	71	48	73	61
14	87	75	80	73	75	63	66	45	59	42	47	35	29	21	35	18	40	33	48	38	77	52	82	64
15	92	73	89	71	73	61	46	33	46	41	42	28	33	25	44	18	37	25	59	39	76	54	80	64
16	88	70	85	73	65	51	49	35	46	30	37	8	41	30	51	36	36	27	57	39	82	59	76	69
17	89	69	79	69	72	55	54	42	48	41	22	7	31	24	41	26	36	19	56	43	84	63	79	67
18	93	73	77	69	73	65	56	39	51	45	34	14	36	26	35	25	27	17	46	43	82	64	80	64
19	95	72	77	69	71	61	59	43	48	45	26	14	40	32	37	21	27	14	49	42	86	65	83	68
20	96	72	84	67	68	61	56	47	48	44	23	14	44	36	35	21	33	20	51	45	88	63	72	61
21	86	73	74	61	65	59	59	55	48	42	23	19	38	24	43	31	56	30	51	42	64	55	79	60
22	77	68	79	61	61	58	61	55	48	42	36	17	30	24	52	34	56	39	62	42	74	54	73	60
23	84	68	77	68	63	57	61	56	47	40	34	20	33	23	41	34	56	38	67	44	67	55	73	57
24	78	62	81	69	68	59	61	53	43	37	24	17	33	16	40	33	58	39	74	48	55	45	82	57
25	77	61	85	69	65	58	59	45	44	34	28	17	25	16	41	34	42	37	63	50	60	48	84	67
26	82	63	81	68	65	57	51	42	43	35	33	28	38	21	39	64	46	37	62	46	68	52	88	66
27	82	64	77	65	60	49	46	41	41	34	33	25	43	31	42	33	48	39	61	49	66	53	72	61
28	85	67	78	63	64	48	47	40	41	34	30	21	36	28	46	34	40	28	50	46	73	52	71	59
29	84	66	80	76	72	55	47	37	41	33	42	25	37	31	....	....	35	30	59	46	77	54	71	59
30	70	64	79	67	62	51	54	39	36	23	38	23	30	30	....	....	48	33	64	46	79	57	78	60
31	73	62	80	67	....	....	57	49	....	....	28	18	43	31	....	....	47	35	....	....	87	60	....	....
Range	39°		32°		39°		39°		47°		43°		37°		36°		44°		41°		48°		31°	
Mt'ly means	77°.7		74°.2		63°.9		51°.3		45°.9		27°.3		28°.7		32°.2		37°.4		47°.2		59°.2		69°.2	

Table of Temperature and of Rainfall at Newark, N. J., from January 1, 1878, to December 31, 1878, by W. A. Whitehead.

MONTHS.	MINM. TEMP'E. Date.	MINM. TEMP'E. Degree.	MAX. TEMP'E. Date.	MAX. TEMP'E. Degree.	Mean Tempt'e of Month.	Fair on Days.	Snow on Days.	Rain on Days.	Total Rain and Melted Snow—Inches.	Monthly Mean of Rain and Melt'd Snow in previous five years.
January	8	9.50	22	48.25	31.00	18	5	11	6.445	3.812
February	4	8.00	28	55.75	33.24	16	2	6	4.960	3.292
March	28	17.25	10	67.00	45.16	18	3	13	3.035	4.958
April	6	40.00	21	78.50	55.55	15	0	8	1.730	4.823
May	14	39.00	26	85.00	60.73	21	0	9	4.205	2.432
June	6	48.75	30	93.25	68.20	18	0	8	2.446	2.677
July	23	61.50	3	98.25	78.25	18	0	11	4.330	5.172
August	28	55.00	9	90.50	73.09	17	0	10	8.060	6.189
September	28	43.75	1-2	88.00	67.47	17	0	10	2.535	4.701
October	29	35.00	2	76.75	56.41	23	0	8	2.823	3.628
November	15	27.00	12	58.00	42.65	18	2	9	4.570	4.569
December	25	13.50	2	57.75	31.83	20	6	7	7.459	2.365
Means and Totals	Feb. 4	8.00	July 3	98.25	53.63	219	18	110	54.363	....
Previous five years	Jan. 12, 1873.	-12.00	July 26, 1877.	99.00	50.48	227	30	97	48.499	....

Thermometers in the shade, having a northern exposure, protected from reflection.

Statement showing how many times the wind was observed blowing from the eight cardinal points of the compass during each month and season of the year, ending June 30, 1877, compiled from the local observations taken at Station Barnegat, N. J., at 7 A. M., 2 P. M. and 9 P. M. (local time.)

WIND.	July, 1876.	August.	September.	October.	November.	December.	January, 1877.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
N.	2	7	11	17	12	16	12	10	8	9	5	3	22	12	40	38
N. W.	10	11	11	18	26	34	25	31	31	18	18	9	67	30	55	90
W.	14	7	13	16	12	15	13	5	2	3	5	9	10	30	41	33
S. W.	26	11	5	16	5	10	19	11	10	3	22	14	35	51	26	40
S.	25	17	12	9	3	4	7	8	15	12	16	36	43	78	24	19
S. E.	4	15	9	3	4	1	2	4	9	15	12	8	36	27	16	7
E.	4	17	22	5	16	4	5	9	7	12	6	7	25	28	43	18
N. E.	8	7	7	9	12	8	9	6	11	17	8	3	36	18	28	23
Calm	0	1	0	0	0	1	1	0	0	1	1	1	2	2	0	2
Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	......

Statement showing how many times the wind was observed blowing, &c., at Station Sandy Hook, N. J.

WIND.	July, 1876.	August.	September.	October.	November.	December.	January, 1877.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
N.	4	7	2	10	14	15	8	10	12	9	10	3	31	14	26	33
N. W.	8	9	18	18	17	23	18	31	27	14	23	8	64	25	53	72
W.	14	8	11	18	15	17	27	15	8	5	15	12	28	34	44	59
S. W.	18	7	6	16	2	13	13	9	5	6	11	11	22	36	24	35
S.	12	11	8	9	2	2	2	3	9	1	8	16	18	39	19	7
S. E.	19	23	15	7	8	0	3	3	12	25	13	25	50	67	30	6
E.	2	8	6	0	0	1	0	4	5	8	0	5	13	15	6	5
N. E.	15	12	21	10	28	16	14	7	13	18	11	6	42	33	59	37
Calm	1	8	3	5	4	6	8	2	2	4	2	4	8	13	12	16
Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Meteorological Summary for 1878 of Observations by E. R. Cook—Station, Trenton

Thermometer highest, July 4th and 18th........ 97°
Thermometer lowest, January 7th........ 12°

Rained on ninety-eight days. *Snowed eighteen times. Five thunder showers. Fifteen fogs. †Twenty-seven frosts. Four hail storms.
First frost, September 16; first ice, October 29; first snow, November 6.

Amount of rain fallen in each month:

	INCHES.
January	7.55
February	2.80
March	3.90
April	1.50
May	4.70
June	5.60
July	4.45
August	4.45
September	3.40
October	1.85
November	4.25
December	5.85
	5.30

Snowfall during the year, 11 inches.
Snowfall since November 6, 4 inches.
*11 snows since November 6.
†17 frosts since September 16.

Report of the Medical Superintendent of Vital Statistics

TO THE SECRETARY OF STATE AND THE STATE BOARD OF HEALTH.

Under the new law concerning the registry and returns of marriages, births and deaths, it is made the duty of the person in charge of vital statistics to study the returns in reference to population and the causes and sources of disease, and the statistics and deductions therefrom are directed to be published as a part of the annual report of the State Board of Health. As the returns previous to June 1st have not yet been published and the year of new record will not be completed until the next annual report, we publish this year the returns as received under the *former* law. The same diligence as usual has been exercised in their collection. The number of marriages, births and deaths are only valuable as in contrast with more approved methods.

Under the new law returns are now received from every city and township of the State. In our next report we shall be able to submit a more correct estimate of the course of population, and of local and general causes of disease, than has before been attempted or been possible in this State. Yet it is to be remembered that a longer period than a single year is required for those more important comparisons which are so instructive for the guide of legislation as to great social questions.

The first intent of governments in such returns was to have a record which is of value in attesting rights of property and inheritance. These are so important as still to call for vigorous methods and careful preservation. References for this purpose are more frequent than generally supposed, and often weighty questions of equity turn thereupon. But vital statistics come to have a far wider sphere since the compilation of full statistics has been found a necessity by all nationalities.

A nation without its statistics is as embarrassed as is a great

mercantile or commercial interest without its data. These must be so analyzed and arranged and reasoned upon as to regulate the State in its plans for development. So vital is this interest that at not infrequent intervals since 1853, the great powers have combined in Statistical Congresses and their deliberations have commanded the attention of all governments. The Austrian Minister of Commerce has well said, "statistics are no longer viewed as a mere theoretical science for the gratification of the curiosity of the learned since they subserve the practical ends of political society and lend service to administration as well in determining the value of existing institutions and laws as in weighing measures not yet carried out." (Toggenburg.)

In this department of statesmanship vital statistics has always commanded large attention and never more than in those later studies which have shown so important relations to the public health. Indeed the originator of the International Statistical Congress and the most distinguished of statisticians is M. Quetelet, of Brussels, whose labors have primary reference to the physical and intellectual laws of population and to the application of their principles to moral and political science. The department of life insurance is an illustration of how much such studies have to do with development of important interests. Dr. Farr, the English statist, speaks of it as one of the higher branches of mercantile interest and one of the most valuable discoveries of modern times. Yet it is directly dependent upon the accurate calculation of probabilities and of expectations of life which have had their origin and development through vital statistics. Some of the embarrassments which have limited its great capacities for the promotion of social and national welfare, have arisen from defects in statistical observations and classification, and from too great reliance on English tables, without adequate facts as to our own climate, temperament and social conditions.

Now no civilized country of Europe is without its system of registration, and our leading States as well as the general government are perfecting their methods and the whole matter is being investigated by experts preparatory to the census of 1880. Lord Bacon stated an axiom when he said "the true greatness of a State consisteth essentially in population and breed of men." "It is not too much to say that modern sanitary science owes its exist-

ence to the registration of death and the localization thereby of insanitary conditions." The language of Elisha Harris, the most eminent of American statists, well expresses their importance:

"The practical relations of well kept and complete records of mortality to the correct estimation of sanitary experience, and to the most essential questions connected with the causation and prevention of diseases and premature death are so important, that sanitary authorities, and the wise and effectual application of public health measures, demand that the mortality registration shall be both complete and accurate. The fact is that the death-rate per thousand living people, fluctuates from eleven to forty, fifty, sixty, and even eighty per annum, in different places, the fluctuations being directly chargeable to the local, the domestic, personal, and to certain avoidable vital and unfortunate physiological conditions of the populations who present these variations in excess of a minimum rate of mortality. The population of London has suffered yearly death-rates equal to eighty, sixty, forty, thirty, and now, less than twenty-four to the thousand, these variations being due to the sanitary conditions under which the people lived, and the vital and constitutional vigor of the successive generations. * * * * *

"The proper understanding of the great governing causes of the premature mortality, on one hand, and of security to life and vigor, on the other, the unfolding and practical application of the laws of health, and of national prosperity and social welfare, and the true basis of wise sanitary administration in communities and States alike demand the complete and faithful registration of vital statistics. * * * * * * *

"Death, with its infinitely varied causes, is not completely described and most usefully studied until the great groups of the agencies that war against life and health are recognized and brought into the systematic account with the records of mortality, and until, indeed, the public records of marriage and birth in the successive generations, and the social, industrial, and general biological circumstances of the populations in communities and States are correspondingly registered and brought under review. The practical significance of death-rates, the economy of sanitary measures, the value of family or race culture, and of hereditary or constitutional health and the improvement of human welfare, will be correctly understood just in pro-

portion as the records of generations of people in all circumstances, and individuals in all these relations, are brought under correct methods of record and study of their life-history, from the cradle to the grave. The true significance of the records of causes of death will ever require the concurrent public registration of birth and marriage. The interests of the living, duty to those who die, and the ends of justice and order in communities alike require that the public records of mortality shall be complete and faithful in every place and among all classes of people. * * * * * * * * * *

"The permit for an interment must ever be the key to prompt compliance with the law for reporting, certifying, and proving or verifying the deaths, in all places." The results which have been obtained under this method and the inefficiency of all other methods fully justify insistance upon this prerequisite. It is only in exceptional cases and in very sparse communities that the requirement will be found inconvenient. This provision is so essential to that correctness which is indispensable that single cases only show that details should be so adjusted as to give the least possible trouble consistent with an assured return.

Our present law after the annoyance incident to any new requirement or change of method affecting so many has been well operated. The chief inconvenience has been where the proper officer has lived at a distance. This can easily be remedied, by powers of additional appointment entrusted to the Secretary of State, and by allowing the permit to be obtained by the undertaker where he resides. In cases where there has been no skilled attendance there can also be more simplicity as to the procurement of a permit; although not a few of such cases are found to result from improper treatment which the law tends to correct, rather than from suddenness of sickness or pecuniary disability.

In cases of interment out of the State by an arrangement with adjacent cities, we are now able to give permits which save the former inconvenience and expense, and the arrangement has been highly approved by all concerned. The marriage returns give far less trouble and are more complete and inexpensive than formerly, and have commended themselves to those concerned.

Our examination indicates that the birth returns will be fuller

than under the former law, but still will not be as complete as those of marriages and deaths. The total increase thus far for six months is over three thousand.

The chief difficulty arises from the inadvertency of physicians or from a feeling on the part of some of them that the State should not exact this service without compensation.

Such as have taken this view are no doubt sincere, but they are mistaken, and are without the support of those of their own profession who have given to the subject close examination and mature thought. The early opposition of some Scotch physicians is a matter of history. But it yielded not more to judicial opinion than it did to the calm advocacy of medical men. In 1874 the law was extended to England—the Registrar General with some severity discusses any dissent from the sustained view of the leading practitioners. It is not to be forgotten that in the advocacy of the voluntary returns of deaths, the Royal Colleges of Physicians, Surgeons and Apothecaries were foremost, and that Sir Henry Halford, Sir Astley Cooper and J. Hingeston, as their presiding officers over their own signatures, and by authority of these bodies, "entreat all authorized practitioners through the country to follow our example and adopt the same practice, and so assist in establishing a better registration in future throughout England." Ever since there has been increasing recognition on the part of practitioners of the importance to themselves as well as to the State of all these vital records. Discussions have been in later years merely as to methods The custom of all our larger cities has been the same. The consideration accorded to our uncertified signatures in such special and vital professional relations makes the rendering as a favor more decorous than claim as a reward, while our practical exemption from all jury duty may at least be reckoned as an offset. The counterfoil furnishes a convenient brief of cases and both the printed nomenclature and the habit of record tend to aid in method and precision. By those in Europe who have a right to speak from experience and for the profession, and by those in our own country who have given special thought thereto, it is recognized that not only does elevation accrue to the profession and service to the State, but that even in a pecuniary direction a reward accrues more than commensurate to the service. We therefore ask with confidence of all practitioners accurate re-

sponse to the requirements as to birth returns, as well as to those of death, as a duty due from our calling and citizenship without that urgency which pay may offer or penalty may enforce.

Our thanks are due to officers of county and city boards, and to the assessors of the townships for an efficiency and a courtesy which shows faithfulness and fulfillment of law beyond any motive which their small compensation can present. For this extra official work the compensation has never before been less than ten cents, and this is as small an amount therefore as economy can indicate. As returns are now made directly to the office of the Secretary of State at Trenton, there is by this a saving on each return over the former law, which will more than allow for the greatly needed increase. The objections that have been made to the practical operations of the law have been carefully considered, and it is fully recognized that the system can be made facile in its operation without impairment of those vital conditions upon which its value depends.

With the confident expectation that we shall be able to present in the future important facts, bearing on the course of population, the health of localities, and the general advancement of the interests of our citizens, this report is respectfully submitted.

MARRIAGES.

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
Atlantic	Atlantic City	......		No return.
	Absecon	13		
	Buena Vista	......		No return.
	Egg Harbor City	15		
	Egg Harbor Township	16		
	Galloway	10		
	Hamilton	5		
	Hammonton	11		
	Mullica	4		
	Weymouth	......		No return.
			74	
Bergen	Englewood	17		
	Franklin	11		
	Harrington	9		
	Hohokus	4		
	Lodi	20		
	Midland	12		
	New Barbadoes	47		
	Palisade	3		
	Ridgefield	5		
	Ridgewood	1		
	Saddle River	5		
	Union	8		
	Washington	......		No return.
			142	
Burlington	Bass River	......		No return.
	Beverly	7		
	Bordentown	29		
	Burlington	32		
	Chester	......		No return.
	Chesterfield	......		No return.
	Cinnaminson	......		No return.
	Evesham	12		
	Florence	......		No return.
	Little Egg Harbor	18		
	Lumberton	20		
	Mansfield	......		No return.
	Medford	11		
	Mount Laurel	......		No return.
	New Hanover	7		
	Northampton	53		
	Pemberton	......		No return.

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
Burlington	Randolph	......		No return.
	Shamong	......		No return.
	Southampton	11		
	Springfield	......		No return.
	Washington	......		No return.
	Westhampton	......		No return.
	Willingboro	......		No return.
	Woodland	......		No return.
			200	
Camden	Camden	155		
	Centre	14		
	Delaware	7		
	Gloucester	12		
	Gloucester City	34		
	Haddon	19		
	Merchantville	4		
	Stockton	4		
	Waterford	6		
	Winslow	6		
			261	
Cape May	Cape May City	......		No return.
	Dennis	10		
	Lower	5		
	Middle	8		
	Upper	15		
			38	
Cumberland	Bridgeton	77		
	Commercial	12		
	Deerfield	2		
	Downe	......		No return.
	Fairfield	33		
	Greenwich	10		
	Hopewell	10		
	Landis	13		
	Maurice River	9		
	Millville	77		
	Stoe Creek	6		
			249	
Essex	Belleville	......		No return.
	Bloomfield	24		
	Caldwell	6		
	Clinton	......		No return.
	East Orange	39		
	Franklin	4		
	Livingston	5		
	Millburn	20		
	Montclair	21		
	Newark	941		
	Orange	67		
	South Orange	14		
	West Orange	7		
			1148	

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
loucester	Clayton	16		
	Deptford	......		No return.
	Franklin	17		
	Greenwich	27		
	Glassboro	16		
	Harrison	27		
	Logan	17		
	Mantua	11		
	Monroe	3		
	Swedesboro	......		No return.
	Washington	16		
	West Deptford	3		
	Woodbury	40		
	Woolwich	12		
			205	
udson	Bayonne	23		
	Guttenburg	......		No return.
	Harrison	7		
	Hoboken	147		
	Jersey City	600		
	Kearney	3		
	North Bergen	42		
	Town of Union	22		
	Union	2		
	Weehawken	1		
	West Hoboken	24		
			871	
unterdon	Alexandria	11		
	Bethlehem	15		
	Clinton	7		
	Delaware	17		
	East Amwell	14		
	Franklin	12		
	Frenchtown	14		
	High Bridge	8		
	Holland	......		No return.
	Kingwood	21		
	Lambertville	37		
	Lebanon	11		
	Raritan	21		
	Readington	33		
	Tewksbury	10		
	Town of Clinton	......		No return.
	Union	......		No return.
	West Amwell	13		
			244	
ercer	Chambersburg	16		
	East Windsor	......		No return.
	Ewing	3		
	Hamilton	13		
	Hopewell	......		No return.
	Lawrence	13		
	Princeton	24		

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
Mercer	Trenton	......		No return.
	Washington	14		
	West Windsor	6		
			89	
Middlesex	Cranbury	13		
	East Brunswick	29		
	Madison	......		No return.
	Monroe	......		No return.
	New Brunswick	......		No return.
	North Brunswick	17		
	Perth Amboy	......		No return.
	Piscataway	19		
	Raritan	21		
	Sayreville	2		
	South Amboy	16		
	South Brunswick	36		
	Woodbridge	......		No return.
			153	
Monmouth	Atlantic	1		
	Eatontown	11		
	Freehold	27		
	Holmdel	8		
	Howell	15		
	Manalapan	14		
	Marlboro	......		No return.
	Matawan	14		
	Middletown	......		No return.
	Millstone	......		No return.
	Ocean	......		No return.
	Raritan	43		
	Shrewsbury	......		No return.
	Upper Freehold	48		
	Wall	.....		No return.
			181	
Morris	Boonton	19		
	Chatham	7		
	Chester	......		No return.
	Hanover	......		No return.
	Jefferson	11		
	Mendham	12		
	Montville	5		
	Morris	50		
	Mount Olive	12		
	Passaic	10		
	Pequannock	12		
	Randolph	......		No return.
	Rockaway	20		
	Roxbury	......		No return.
	Washington	......		No return.
			158	
Ocean	Berkeley	3		
	Brick	......		No return.
	Dover	6		

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
ean	Eaglewood	......		No return.
	Jackson	......		No return.
	Lacey	......		No return.
	Manchester	5		
	Ocean	......		No return.
	Plumsted	14		
	Stafford	2		
	Union	7	37	
s-aic	Acquackanonk	5		
	Little Falls	......		No return.
	Manchester	......		No return.
	Passaic	......		No return.
	Paterson	337		
	Pompton	28		
	Wayne	5		
	West Milford	25	400	
em	Elsinboro	......		No return.
	Lower Alloways Creek	8		
	Lower Penns Neck	8		
	Mannington	13		
	Pilesgrove	15		
	Pittsgrove	13		
	Quinton	......		No return.
	Salem	54		
	Upper Alloways Creek	......		No return.
	Upper Penns Neck	18		
	Upper Pittsgrove	13	142	
nerset	Bedminster	21		
	Bernards	20		
	Branchburg	......		No return.
	Bridgewater	142		
	Franklin	9		
	Hillsborough	16		
	Montgomery	11		
	North Plainfield	11		
	Warren	10	240	
ssex	Andover	4		
	Byram	11		
	Frankford	4		
	Green	2		
	Hardyston	......		No return.
	Hampton	1		
	Lafayette	......		No return.
	Montague	5		
	Newton	......		No return.
	Sandyston	16		
	Sparta	5		
	Stillwater	11		
	Vernon	......		No return.

COUNTIES.	TOWNSHIPS.	Number.	Total in County.	REMARKS.
Sussex	Walpack	12		
	Wantage	15		
			86	
Union	Clark	......		No return.
	Cranford	......		No return.
	Elizabeth	192		
	Fanwood	......		No return.
	Linden	10		
	New Providence	......		No return.
	Plainfield	30		
	Rahway	41		
	Springfield	6		
	Summit	......		No return.
	Union	15		
	Westfield	5		
			299	
Warren	Allamuchy	3		
	Belvidere	......		No return.
	Blairstown	12		
	Franklin	9		
	Frelinghuysen	12		
	Greenwich	23		
	Hackettstown	11		
	Hardwick	5		
	Harmony	18		
	Hope	10		
	Independence	......		No return.
	Knowlton	7		
	Lopatcong	6		
	Mansfield	13		
	Oxford	......		No return.
	Pahaquarry	......		No return.
	Phillipsburg	.....		No return.
	Town of Washington	29		
	Washington	......		No return.
			158	

RECAPITULATION.

MARRIAGES IN THE SEVERAL COUNTIES.

COUNTIES.	Number.	REMARKS. TOWNSHIPS IN WHICH NO RETURNS HAVE BEEN MADE.
Atlantic	74	Atlantic City, Buena Vista, Weymouth.
Bergen	142	Washington.
Burlington	200	Bass River, Chester, Chesterfield, Cinnaminson, Florence, Mansfield, Mount Laurel, Pemberton, Randolph, Shamong, Springfield, Washington, Westhampton, Willingboro, Woodland.
Camden	261	
Cape May	38	Cape May City.
Cumberland	249	Downe.
Essex	1,148	Belleville, Clinton.
Gloucester	205	Deptford, Swedesboro.
Hudson	871	Guttenburg.
Hunterdon	244	Holland, Town of Clinton, Union.
Mercer	89	East Windsor, Hopewell, Trenton.
Middlesex	153	Madison, Monroe, New Brunswick, Perth Amboy, Woodbridge.
Monmouth	181	Marlboro, Middletown, Millstone, Ocean, Shrewsbury, Wall.
Morris	158	Chester, Hanover, Randolph, Roxbury, Washington.
Ocean	37	Brick, Eagleswood, Jackson, Lacey, Ocean.
Passaic	400	Little Falls, Manchester, Passaic.
Salem	142	Elsinboro, Quinton, Upper Alloways Creek.
Somerset	240	Branchburg.
Sussex	86	Hardyston, Newton, Vernon.
Union	299	Clark, Cranford, Fanwood, New Providence, Summit.
Warren	158	Belvidere, Independence, Oxford, Pahaquarry, Phillipsburg, Washington.
Total in State	5,375	

BIRTHS.

Births in Atlantic County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
con......................	6	4	......	......	1	......	8	1	1	1	11
antic City................	......	......	......	......	......	......	......	......	......	......	......
na Vista................	......	......	......	......	......	......	......	......	......	......	......
Harbor City............	16	20	......	1	19	4	10	2	......	......	36
Harbor Township.....	36	39	15	......	6	4	49	1	......	......	75
way	28	19	15	......	2	2	28	......	......	......	47
ilton	22	18	8	......	7	1	18	6	......	......	40
monton	24	15	9	1	8	4	13	4	......	......	39
ica..........................	7	3	4	......	3	......	......	1	2	......	10
mouth	9	8	2	......	2	1	12	1	......	1	18
eturns.	148	126	53	2	48	16	138	16	3	2	276

Births in Bergen County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.							Sex not reported.	Total.
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.		
Englewood	35	38	2	......	24	8	34	3	2	......	73
Franklin	18	6	13	......	6	......	4	1	......	......	24
Harrington	29	27	8	......	12	7	29	......	......	......	56
Hohokus	3	1	4	......	......	......		......	......	1	5
Lodi	60	63	3	2	4	18	50	3	......	1	124
Midland	20	26	16	......	11	4	4	1	......	......	46
New Barbadoes	55	45	1	......	24	21	31	16	7	......	100
Palisade	16	7	3	......	4	3		1	2	1	24
Ridgefield	9	12	7	1	9	6		3	11	27	48
Ridgewood	6	10	2	......	3	2	9	......	......	......	16
Saddle River	11	12	11	......	2	1	9	......	......	......	23
Union	35	39	6	1	18	7	38	5	......	1	75
*Washington	......	......	..	......	......	......		......	......	......	......
	297	286	76	4	161	77	24	33	22	31	614

*No returns.

Births in Burlington County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.							Sex not reported.	Total.
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.		
River		......		......	......	......	......		......	......	......
ly City		13	1	......	10	4	9		......	......	24
ly	3	12	3	......	1	......	17	4	......	......	25
ntown	44	26	5	......	23	11	29	2	......	......	70
ıgton	68	67	0	3	45	18	49	6	4	......	135
:er	..	......		......	......	......	......	......	......	......	......
:erfield	..	......		......	......	......	......	......	......	......	......
aminson	..	......		......	......	......	......	......	......	......	......
am	0	20	0	......	2	2	14	......	4	2	32
:nce	..	......		......	......	......	......	......	......	......	......
Egg Harbor	43	23	5	1	11	4	43	2	......	......	66
erton	9	17	14	......	4	......	8	......	......	......	26
ıfield	..	......		.. ..	......	......	......	......	......	......	......
rd	13	15	12	......	5	3	6	2	......	......	28
ıt Laurel	..	......	......	......	......	......	......	......	......	......	......
Ianover	23	16	8	......	5	5	19	2	......	......	39
ampton	23	24	......	1	13	2	19	3	10	1	48
ɔerton	..	......	......	......	......	......	......	......	......	......	......
lolph	..	......	......	......	......	......	......	......	......	......	......
ıong	..	......	......	......	......	......	......	......	......	......	......
ımpton	6	8	5	......	6	1	12	......	......	......	24
ıgfield	..	......	......	......	......	......	......	......	......	......	......
ıington	..	......	......	......	......	......	......	......	......	......	......
hampton	..	......	......	......	......	......	......	......	......	......	......
ingboro	..	......	......	......	......	......	......	......	......	......	......
dland	..	......	......	......	......	......	......	......	......	......	......
turns.	273	241	73	5	125	50	225	21	18	3	517

Births in Camden County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.									
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Camden	519	445	3	10	69	22	84	15	875	124	1088
Centre	16	27	4	......	3		24	1	1	......	43
Delaware	12	10	1	......	1		10	......	......	......	22
Gloucester	28	32	21	2	2	2	26	......	16	9	69
Gloucester City	58	59		......	48	1	51	6	......	......	117
Haddon	33	27	12	......	11	3	20	4	......	......	60
Merchantville	5	3	1	......	1	2	3	1	......	......	8
Stockton	29	20	4	......	......	......	42	......	3	......	49
Waterford	3	1	1	......	1	......	2	......	......	......	4
Winslow	9	18	4	......	13	......	10	......	......	......	27
	712	642	82	12	149	50	272	27	895	133	1487

Births in Cape May County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.									
	Male.	Female.	Farmer.	Manufacturer	Mechanic.	Merchant.	Laborer.	Profession.	Not reported.	Sex not reported.	Total.
*Cape May City	......	......	......	......	......	......	......	......	......	......	......
Dennis	11	15	6	......	3	2	14	1	......	......	26
Lower	16	20	9	......	9	......	15	2	1	......	36
Middle	16	16	8	......	3	1	18	2	......	......	32
Upper	20	26	13	1	4	1	27	......	......	......	46
*No returns.	63	77	36	1	9	4	74	5	1	......	140

Births in Cumberland County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer	Manufacturer	Mechanic.	Merch nt.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
eton	109	88	28	3	63	24	57	12	10	......	197
ıercial	47	24	19	......	9	5	39	......	......	1	72
ıeld	18	17	23	......	2	1	9	......	......	......	35
ne	......	......	......		......			..	...	......	......
eld	35	54	16		7	4	30	2	30	......	89
wich	14	16	10		1		9	..	...	......	30
well	19	12	17		3	1	14	..	...	4	35
s	43	46	50		18	9	7	4	...	......	89
ice River	37	40	20		3	2	5	1	...	......	77
ille	94	76	9		112	15	21	8	5	......	170
:reek	13	9	11		......		10	1	1	1	23
turn.	429	382	203	4	218	61	257	28	46	6	817

Births in Essex County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
:ville	......	......	...	..	...	...	.....	......	......	......	......
ıfield	63	47	7	5	41	13	39	5	......	......	110
'ell	22	18	12	1	19	5	3	......	......	......	40
n	9	14	7	..	7	10	5	4	......	......	33
)range	59	59	...	4	36	30	25	23	......	......	118
.lin	4	6	...	..	5	......	5	......	......	......	10
gston	3	2	4	..	...	......	......	1	......	......	5
ırn	25	26	...	1	9	2	11	......	28	......	51
:lair	58	67	7	..	28	19	57	13	1	......	125
rk	1913	1890	22	135	465	432	1193	58	498	......	3803
'e	133	147	......	2	10	30	28	5	105	......	280
Orange	37	46	8	..	12	15	40	8	......	......	83
Orange	35	21	2	..	24	6	22	2	......	......	56
:urn.	2371	2343	69	148	756	562	1428	119	632	......	4714

Births in Gloucester County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Clayton	33	29	11	2	23	2	21	3	......	......	62
Deptford	20	17	11	......	3	3	18	2	......	......	37
Franklin	40	31	27	1	19	2	20	2	......	......	71
Greenwich	34	29	28	2	4	4	21	4	......	......	63
Glassboro	24	34	4	......	16	3	34	1	......	......	58
Harrison	30	24	38	2	6	4	......	4	......	......	54
Logan	19	15	19	......	1	......	13	1	......	......	34
Mantua	21	20	21	......	5	5	9	1	......	......	41
Monroe	16	17	2	......	17	2	12	......	......	......	33
*Swedesboro	......	......	......	......	......	......	......	......	......	......	......
Washington	17	18	21	......	1	1	9	1	2	......	35
West Deptford	12	17	28	......	2	2	2	1	......	6	35
Woodbury	25	20	3	......	14	8	18	5	4	7	52
Woolwich	24	22	21	......	6	1	19	......	......	1	47
	315	293	234	7	117	37	196	25	6	14	622

*No return.

Births in Hudson County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Bayonne	99	82	......	5	36	32	96	8	4	......	181
*Guttenburg	......	......	......	......	......	......	......	......	......	......	......
Harrison	36	27	3	2	31	8	16	3	......	......	63
Hoboken	312	293	......	7	232	166	184	13	3	......	605
Jersey City	618	608	3	21	463	275	394	32	38	......	1226
Kearney	9	7	......	1	8	......	6	1	......	......	16
North Bergen	14	11	2	......	7	4	9	1	2	......	25
Town of Union	61	61	3	3	60	23	29	4	......	......	122
Union	22	7	......	......	18	8	2	1	......	......	29
Weehawken	4	1	......	......	4	......	1	......	......	......	5
West Hoboken	33	31	1	......	26	15	17	2	3	......	64
	1208	1123	12	39	885	531	754	65	50	......	2336

*No return.

Births in Hunterdon County.

)WNSHIPS.	SEX.		OCCUPATION OF FATHER.							Sex not reported.	Total.
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.		
ria	10	23	12	......	4	5	10	2	......	......	33
ɜm	19	13	9	......	3	2	16	2	......	......	32
	28	11	18	......	6	1	13	1	......	......	39
e	37	32	26	......	11	4	22	6	......	......	69
ıwell	22	11	18		5	4	6	......	......		33
ı	11	13	17		4	1	2	......	......		24
)wn	5	2	1		4	1	1	......	......		7
·idge	24	18	11		6	4	20	1	......		42
d	......	......	......		......	......	......	......	......		......
ɔd	20	16	20		5	3	7	1	......		36
.ville	72	33	......		47	8	45	5	2	2	107
	13	13	12		2	1	11	......	......		26
	21	21	21		5	4	11	1	......		42
ton	22	22	22		5	4	10	3	......		44
ıry	9	12	16		3	......	1	1	......		21
›f Clinton	......	......	......		......	......	......	......	......		......
	5	5	6		......	1	3	......	......		10
ıwell	11	11	4		2	1	15	......	......		22
n.	329	256	213	......	112	44	193	23	2	2	587

Births in Mercer County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer	Manufacturer	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Chambersburg	48	44	......	......	49	6	35	2	......	......	92
*East Windsor	...			......	......		...	......	......	......	......
Ewing	16	0	7	......	1		16	1	......	......	26
Hamilton	25	9	7	......	3		23	......	......	......	44
*Hopewell	...			......			...	......	......	......	......
Lawrence	29	29	1	......	22		23	2	......	......	58
Princeton	27	20	8	......	5	6	24	1	3	......	47
*Trenton	......			......			...	......	......	......	......
Washington	*7	4	5	......	2		2	1	......	......	11
West Windsor	19	9	9	......	2		7	......	......	......	28
*No return.	171	35	67	......	84	15	30	7	3	......	306

Births in Middlesex County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Cranbury	15	6	9		1	1	9	..	1		21
East Brunswick	37	45	28		7	7	27	2	1		82
*Madison	...	..	...		..	......	......	..	......		......
*Monroe	...	..	...		..	......	......	..	......		......
*New Brunswick	...	..	...	......	......	......	......	..	......		......
North Brunswick	14	6	10	......	15	3	1	1	......		30
*Perth Amboy	...	..	...	......	......	......	......	..	......		......
Piscataway	36	37	23	......	8	13	23	4	2		73
Raritan	52	37	26	2	17	2	37	4	1		89
Sayreville	15	7	...	......	1	3	18	..	......		22
South Amboy	53	55	...	......	17	8	80	3	......	......	108
South Brunswick	34	25	28	......	3	4	23	1	......	......	59
*Woodbridge	...	..	...	......	......	......	......	..	......	......	......
*No return.	256	228	124	2	79	41	218	5	5	......	484

Births in Monmouth County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.							Sex not reported.	Total.
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.		
Atlantic	0	9	5		3	3	8	......	1	1	20
Eatontown	25	6	9	2	10	3	16	1		......	41
Freehold	4	3	1		1	1	3	1		......	7
Holmdel	7	7	4		...	......	10	......		......	14
Howell	3	23	14		9	......	8	2	4	1	37
Manalapan	9	6	16		2	7	10	1		1	36
*Marlboro		..	..		...	......	...	......		......	......
Matawan	40	33	6		10	6	47	3		......	73
*Middletown		.	..	......	......	......	......	......		......	......
*Millstone	......	.	..	......	......	......	......	......	......	......	......
*Ocean	......		..	......	......	......	......	......	......	......	......
Raritan	46	51	8	......	12	15	61	1	......	......	97
*Shrewsbury	......	......	......	......	......	......	......	......	......	......	......
Upper Freehold	21	30	11	......	2	4	32	1	1	......	51
*Wall	......	......	......	......	......	......	......	......	......	......	......
	185	188	74	3	49	39	195	10	6	3	376

*No return.

Births in Morris County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported	Total.
Boonton	12	27	1	......	13	5	16	1	3	......	39
Chatham	33	32	9	2	16	5	29	4		......	65
*Chester	......	......	......	......	......	......	......	..		......	......
*Hanover	......	......	......	......	......	......	......	..		......	......
Jefferson	16	10	11	......	3	1	11	..		......	26
Mendham	13	14	11	......	3	2	2	..	9	......	27
Montville	4	7	8	......	1	......	1	..	1	......	11
Morris	165	132	9	2	50	41	165	0	30	0	307
Mount Olive	15	21	7	......	4	......	23	2	......		36
Passaic	17	14	15	1	5	2	8	..	......		31
Pequannock	22	23	19	......	10	5	10	1	......		45
*Randolph	......	......	......	......	......	......	......	..	......		......
Rockaway	91	81	16	1	21	3	126	5	......		172
*Roxbury	......	......	......	......	......	......	......		......		......
*Washington	......	......	......	......	......	......	......		......		......
	388	361	106	6	126	64	391	23	43	10	759

*No return.

Births in Ocean County.

TOWNSHIPS.	SEX. Male.	Female.	OCCUPATION OF FATHER. Farmer.	Manufacturer	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
eley	6	3	3	......	1	1	4	......		......	9
'k	......	......	......	......	......	......	......	......		......	......
r	36	28	13	1	7	5	33	5		......	64
leswood	......	......	......	......	......	......	......	......		......	......
son	......	......	......	......	......	......	......	......		......	......
ey	......	......	......	......	......	......	......	......		......	......
hester	11	8	2	......	4	......	12	1		......	19
an	......	......	......	......	......	......	......	......		......	......
sted	30	24	13	......	10	......	29	2		......	54
rd	9	10	7	......	2	1	7	2		......	19
n	15	12	1	......	2	1	20	2	1	......	27
turn.	107	85	39	1	26	8	105	12		......	192

Births in Passaic County.

TOWNSHIPS.	SEX. Male.	Female.	OCCUPATION OF FATHER. Farmer	Manufacturer	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
ackanonk	14	10	13	......	3	1	7	......	......		24
le Falls	......	......	......	......	......	......	......	......	......		......
chester	......	......	......	......	......	......	......	......	......		......
aic	......	......	......	......	......	......	......	......	......		......
son	689	664	12	33	593	200	460	40	15	......	1353
ton	23	22	9	......	4	1	30	......	1	......	45
ie	17	8	10	......	8	......	7	......	......	......	25
Milford	41	40	37	......	11	2	31	......	......	......	81
turn.	784	744	81	33	619	204	535	40	16	......	1528

Births in Salem County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer	Professional	Not reported.	Sex not reported.	Total.
*Elsinboro	......	......	......	......	......		......				......
Lower Alloways Creek	20	9	12	......	2		14	......			29
Lower Penns Neck	12	17	15	......	1		11	1			29
Mannington	38	27	17	......	4	1	35	......	8		65
Pilesgrove	14	20	9	......	5	3	16	1	......	......	34
Pittsgrove	14	12	13	......	1	1	10	1	......	......	26
Quinton	7	13	6	......	6		7	......	1	......	20
Salem	58	43	3	......	40	8	47	3	......	......	101
Upper Alloways Creek	8	5	6	1	4	1	1	......	......	......	13
Upper Penns Neck	52	40	36	......	8	7	39	2	......	......	92
Upper Pittsgrove	31	21	30	......	3	1	17	1	......	......	52
*No return.	254	207	147	1	74	24	197	9	9	......	461

Births in Somerset County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported	Sex not reported.	Total.
Bedminster	23	18	15	......	7	5	18	1		5	46
Bernards	34	27	28	......	12	4	15	2			61
*Branchburg	......	......	......	......	......	...	......	..			......
Bridgewater	79	67	10	......	42	18	69	7			146
Franklin	50	42	29	......	22	7	26	4	5		93
Hillsborough	36	27	22	......	8	4	27	2			63
Montgomery	20	27	16	......	7	...	14	3		......	40
North Plainfield	39	32	6	1	30	21	8	5		......	71
Warren	12	4	15	......	6	1	3	......	1	......	26
*No return.	293	247	141	1	134	60	180	24	6	6	546

Births in Sussex County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer	Mechanic.	Merchant.	Laborer	Professional.	Not reported.	Sex not reported.	Total.
over	7	5	3		1	3	5	......	......	......	12
.m	24	7	8		1	2	18	2	......	......	31
kford	13	4	6	......	3	......	6	......	2	......	17
ne	10	3	7	......	2	......	4	......	......	......	13
rdyston	......	......	......	......	......	......	......	......	......	......	......
ipton	4	6	5	......	......	......	5	......	......	......	10
ayette	......	......	......	......	......	......	......	......	......	......	......
tague	7	6	6	......	1	1	5		......	......	13
wton	......	......	......	......	......	......	......		......	......	......
lyston	2	4	5	......		......	1		......	......	6
ta	25	17	8	......	4	3	27		......	......	42
water	28	18	18	......	6	3	19		......	......	46
rnon	......	......	......	......		......	......		......	......	......
pack	11	5	13	......	2	......	......		1	......	16
itage	26	17	20	......	2	4	16	1	......	......	43
eturn.	157	92	99	......	22	16	106	3	3	......	249

Births in Union County.

TOWNSHIPS.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
*Clark	......	......	......	......	......	......	......	......	......	......	......
*Cranford	......	......	......	......	......	......	......	......	......	......	......
Elizabeth	712	683	13	19	540	94	536	42	151	......	1395
Fanwood	3	10	3	......	3	1	5	1	......	......	13
Linden	16	11	6	......	5	2	12	2	......	......	27
*New Providence	......	......	......	......	......	......	......	......	......	......	......
Plainfield	62	82	3	......	27	7	20	10	77	......	144
Rahway	78	88	1	5	65	19	60	7	9	......	166
Springfield	11	20	2	2	7	3	5	..	12	......	31
*Summit	......	......	......	......	......	......	......	......	......	......	......
Union	31	33	13	......	10	11	27	3	......	......	64
Westfield	17	16	1	......	9	7	14	2	......	......	33
	930	943	42	26	666	144	679	67	249	......	1873

*No return.

Births in Warren County.

ɔWNSHIPS.	SEX.		OCCUPATION OF FATHER.							Sex not reported.	Total.
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.		
chy	10	8	6	......	......	1	9	......	2	......	18
ere	......	......	......	......	......	......	......	......	......	......	......
wn	14	26	13	......	12	4	10	1	......	......	40
n	13	17	17	......	1	2	9	1	......	......	30
huysen	9	19	9	......	2	2	14	......	1	......	28
ich	43	42	21	......	18	6	36	2	2	......	85
stown	19	28	1	......	13	8	23	2	......	......	47
ck	10	6	11	......	1	......	1	......	3	......	16
ıy	13	11	10	......	5	1	7	1	......	......	24
	19	18	10	......	......	2	23	2	......	......	37
ndence	......	......	......	......	......	......	......	......	......	......	......
ɔn	19	14	14	......	3	3	12	1	......	......	33
ng	33	24	9	......	9	1	38	......	......	......	57
ld	23	17	16	......	2	5	14	......	4	1	41
	......	......	......	......	......	......	......	......	......	......	......
arry	8	3	5	......	3	......	3	......	......	......	11
sburg	......	......	......	......	......	......	......	......	......	......	......
f Washington	21	* 26	2	1	16	6	19	3	......	......	47
gton	19	10	4	......	4	2	18	1	......	......	29
n.	273	269	148	1	89	43	236	14	12	1	543

RECAPITULATION.

BIRTHS IN THE SEVERAL COUNTIES.

COUNTIES.	SEX.		OCCUPATION OF FATHER.								
	Male.	Female.	Farmer.	Manufacturer.	Mechanic.	Merchant.	Laborer.	Professional.	Not reported.	Sex not reported.	Total.
Atlantic	148	126	53	2	48	16	138	16	3	2	276
Bergen	297	286	76	4	161	77	241	33	22	31	614
Burlington	273	241	73	5	125	50	225	21	8	3	517
Camden	712	642	82	12	149	50	272	27	895	133	1487
Cape May	63	77	36	1	19	4	74	5	1		140
Cumberland	429	382	203	4	218	61	257	28	46	6	817
Essex	2371	2343	69	148	1756	562	1428	19	632		4714
Gloucester	315	293	234	7	117	37	196	25	6	14	622
Hudson	1208	1128	2	39	885	531	754	65	50	..	2336
Hunterdon	329	256	213	.....	112	44	193	23	2	2	587
Mercer	171	135	67	.....	84	15	130	7	3		306
Middlesex	256	228	124	2	79	41	218	15	5	...	484
Monmouth	185	188	74	3	49	39	195	10	6	3	376
Morris	388	361	106	6	126	64	391	23	43	10	759
Ocean	107	85	39	1	26	8	105	12	1	...	192
Passaic	784	744	81	33	619	204	535	40	16	...	1528
Salem	254	207	47	1	74	24	197	9	9	...	461
Somerset	293	247	141	1	134	60	180	24	6	6	546
Sussex	157	92	99	.....	22	16	106	3	3	......	249
Union	930	943	42	26	666	144	679	67	249	......	1873
Warren	273	269	148	1	89	43	236	14	12	1	543
	9943	9273	2119	296	5558	2090	6750	586	2028	211	19427

TOWNSHIPS.	SEX.		CAUSE OF DEATH, AND NUMBER FROM EACH CAUSE.																								
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty	Consumption.	Childbed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small-pox.	Typhus Fever.	Whooping Cough	All others.	Sex not reported.	Cause not reported.	Total.
Absecon	7	9	...			4	...	...	...	...	1	2	...	...	...	...	..	2	...	1	1	...			2	...	2	16
*Atlantic City	.....	......	...			...	...	...		...	...	...	...	...	...	...	..		...	...	...	...			..	...	...	......
*Buena Vista	.....	......	...	...		...	...	...		...	...	...	...	...	...	...	..		...	...	...	...			..	...	...	......
Egg Harbor City	13	14	2	...		...	...	...		1	1	...	...	...	...	...	..		...	...	10	...			2	...	...	27
Egg Harbor Township	21	15	...	1		8	1	...		...	2	2			...	1	1	1	...	...	3	...			8	...	7	36
Galloway	24	6	...	...	2	10	...	1		2	...	...			1	...	1		...	...	2	...	1		10	...	...	30
Hamilton	14	11	...			6	2	...		1	2	...			...	...	..		...	...	8	...			5	...	1	25
Hammonton	16	24	...			8	1	...	4	1	1	...	1		...	...	..		4	2	8	...		1	8	...	...	40
Mullica	4	2	...			1	...	...	..	...	...	...			...	...	..		...	...	4	...			...	...	...	6
Weymouth	1	2	...			...	...	...	..	...	...	...			...	...	..		...	...	...	...			...	...	3	3
*No return.	100	83	2		5	37	4	1	5	5	7	4			1	1	2	3	4	3	36	...	2	1	45	...	13	183

Deaths in Bergen County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diptheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Wooping Cough.	All others.	Sex not reported.	Cause not report.	Total.
Englewood	21	21	...	...	1	2	1	1	3	3	1	1	11	...	1	...	...	...	...	1	6	...	1	...	8	...	1	42
Franklin	8	6	...	...	...	4	...	...	...	2	...	1	...	...	...	...	...	...	2	2	...	...	...	...	2	...	1	14
Harrington	22	22	2	...	4	7	...	1	...	1	2	1	1	...	4	...	1	...	1	...	...	...	...	...	19	...	...	44
Hohokus	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	2	...	...	4
Lodi	25	15	1	...	...	4	...	2	2	2	3	3	1	1	2	...	...	...	...	1	3	...	...	...	14	...	1	40
Midland	21	22	1	...	2	7	1	...	1	2	5	2	...	...	1	...	3	...	2	1	3	...	...	...	11	...	1	43
New Barbadoes	29	27	1	...	5	9	...	...	1	...	6	1	...	1	2	...	...	...	...	4	...	...	...	...	24	1	3	57
Palisade	4	4	...	1	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	1	...	...	...	...	4	...	...	8
Ridgfield	......	......	...	...	...	2	...	1	4	1	...	...	...	...	...	...	...	...	2	2	...	...	...	...	4	21	5	21
Ridgewood	3	2	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	3	...	...	...	......	...	...	5
Saddle River	6	3	...	...	...	4	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...	2	...	...	9
Union	22	26	...	...	4	10	...	...	...	1	8	1	1	...	1	...	...	...	1	...	2	...	1	...	15	4	7	52
*Washington	......	......	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	......	...	...	......
	164	149	5	1	16	49	2	5	11	12	26	10	17	2	12	...	4	...	10	12	18	...	3	...	105	26	19	339

*No return.

Deaths in Burlington County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small-pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not report'd.	Total.
*Bass River	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Beverly City	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Beverly	8	10	1	...	1	1	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	...	2	...	10	...	...	18
Bordentown	88	87	...	...	6	34	3	9	10	6	6	4	...	...	8	3	...	...	11	5	15	...	5	...	43	...	12	175
Burlington	71	66	1	...	4	36	...	7	10	3	15	...	...	...	1	...	...	...	2	7	12	...	2	...	34	...	3	137
*Chester	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Chesterfield	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Cinnaminson	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Evesham	7	6	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	8	...	1	13
*Florence	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Little Egg Harbor	14	15	1	...	1	6	...	...	1	2	12	...	...	...	...	...	...	...	...	1	...	...	1	...	3	...	1	29
Lumberton	12	14	...	...	1	9	...	1	2	1	1	1	...	...	...	...	...	...	2	...	1	...	...	...	6	...	1	26
*Mansfield	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Medford	20	13	...	...	...	7	...	1	1	...	2	...	...	...	...	...	...	...	2	1	...	...	3	...	11	5	10	38
*Mount Laurel	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
New Hanover	12	11	...	2	...	5	...	...	7	...	...	...	...	...	...	...	...	...	2	3	...	...	...	...	3	...	1	23
Northampton	32	33	1	...	1	14	...	1	4	1	4	...	...	1	1	...	...	...	2	4	4	...	2	...	20	...	5	65
*Pemberton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Randolph	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Shamong	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Southampton	5	4	...	...	...	1	...	1	...	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	9
*Springfield	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Washington	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Westhampton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Willingboro	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Woodland	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	269	259	4	2	14	115	3	20	35	14	43	7	...	1	5	5	...	...	21	21	33	...	15	...	139	5	36	533

*No return.

Deaths in Camden County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diptheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Camden	291	235	18	...	19	122	8	22	53	61	75	22	7	9	22	8	19	16	...	17	20	7	32	16	312	380	21	906
Centre	14	19	...	...	2	8	...	1	2	2	1	...	1	...	...	...	...	...	1	...	3	...	...	...	10	......	2	33
Delaware	5	9	...	...	1	2	...	...	1	1	...	1	...	1	...	...	...	...	...	2	...	...	1	...	3	......	1	14
Gloucester	29	20	...	...	...	9	...	...	1	1	2	5	1	...	...	...	...	...	1	...	3	...	...	...	26	3	3	52
Gloucester City	10	18	...	...	2	5	...	...	2	4	1	1	...	...	1	...	...	...	...	...	...	...	2	...	8	......	2	28
Haddon	24	22	1	...	1	8	...	1	3	1	3	...	1	...	2	...	...	...	2	1	...	...	2	...	19	......	1	46
Merchantville	2	3	...	...	...	......	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	......	...	5
Stockton	4	5	...	...	...	......	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	......	......	9	9
Waterford	24	19	...	...	4	5	...	...	1	...	1	2	...	...	...	...	...	...	3	...	6	...	2	...	16	......	3	43
Winslow	5	7	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	4	......	2	12
	408	357	19	...	29	162	8	24	63	71	85	31	10	10	25	8	19	16	7	21	34	7	39	16	400	383	44	1148

Deaths in Cape May County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy	Bilious Fever	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infan um.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
*Cape May City	......				...	...	...	...		...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	......
Dennis	16		3	...	...	6	...		...	...	...	3	...	...	...	..	...	...	3	...	...	...	2	...	5	2	7	29
Lower	20	24	1	...	...	6	...	2	...	...	15	2	...	...	...	...	...	...	2	...	...	...	1	...	14	...	1	44
Middle	12	7	...	...	1	5	2	...	...	...	5	2	...	...	1	...	...	...	...	1	...	...	...	...	2	...	...	19
Upper	8	8	...	1	2	2	...	...	1	...	...	3	...	...	...	...	...	...	1	...	...	...	1	...	3	...	2	16
	56	50	4	1	3	19	2	2	1	...	20	10	...	...	1	...	...	...	6	1	...	...	4	...	24	2	10	108

*No return.

Deaths in Cumberland County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																								
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sexes not reported.	Cause not reported.	Total.
Bridgeton	65	70	...	...	2	37	2	...	16	4	1	4	...	...	...	...	...	8	8	7	...		3	2	41	...	..	135
Commercial	14	8	1	1	...	6	...	...			...	...	2	...	...	...	...	...	...	...	...		2	2	3	3	8	25
Deerfield	3	5	...	...	...	......	1	...		1	1	1	1	1	...	...	...	...	...	...	...		...	...	2	...	..	8
*Downe	......	......	...	...	...	......	...	...		...	...	...	...	...	...	...	...	...	...	...	...		...	...	......	...	..	......
Fairfield	10	15	...	...	1	1	...	...		...	...	...	...	...	...	...	...	...	3	...	...		6	...	......	...	4	25
Greenwich	9	5	...	...	...	2	...	...	4	...	1	...	...	...	...	...	...	1	1	...	...		...	...	4	...	1	14
Hopewell	21	12	...	1	...	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	2	...	24	33
Landis	23	22	...	...	4	10	...	1	1	1	13	...	3	...	2	...	...	...	1	1	...	...	...	...	8	...	......	45
Maurice River	9	16	...	1	1	4	1	...	2	1	...	1	...	...	1	...	...	...	1	1	...	...	...	...	11	...	......	25
Millville	60	54	...	2	7	26	1	1	14	1	...	7	...	...	2	1	3	...	3	2	3	...	3	2	18	5	23	119
Stoe Creek	1	7	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	2	...	2	8
	215	214	1	6	15	91	5	2	37	8	16	13	6	1	5	1	3	10	18	12	4	...	14	6	91	8	72	437

*No returns.

Deaths in Essex County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
*Belleville	......	......	...	...	......	......	...	...	......	......	...	...	...	...	...	......	......	...	...	...	......	...	......	...	......	...	...	......
Bloomfield	34	22	1	...	1	11	...	2	2	......	3	3	3	...	...	......	......	...	2	2	......	...	......	...	26	...	...	56
Caldwell	18	18	...	...	......	6	1	1	......	......	4	...	...	...	...	......	......	1	1	3	1	...	......	...	16	4	6	40
Clinton	14	12	...	...	......	4	...	...	2	......	2	...	...	...	...	......	......	...	2	1	8	...	......	...	7	...	...	26
East Orange	28	27	1	...	1	15	...	5	1	......	3	...	...	...	1	......	1	...	3	1	1	...	......	1	21	...	...	55
Franklin	11	7	...	...	......	5	...	2	3	......	2	...	...	...	...	......	......	...	1	...	1	...	......	...	4	...	...	18
Livingston	3	6	...	...	......	2	...	...	......	......	...	...	...	...	...	......	......	...	...	...	2	...	......	...	5	...	...	9
Millburn	......	1	1	...	2	6	...	...	......	......	...	1	...	1	...	......	......	...	...	1	......	...	......	...	4	29	14	30
Montclair	23	20	...	1	......	10	2	5	......	......	...	...	...	...	...	......	......	...	1	...	1	...	......	...	23	3	3	46
Newark	1660	1643	45	5	143	497	13	52	250	398	69	82	38	11	71	261	270	12	72	54	92	13	150	20	673	...	12	3303
Orange	15	18	...	1	1	11	...	1	4	2	6	3	...	...	1	......	......	...	...	2	4	...	......	4	18	50	25	83
South Orange	17	9	...	...	......	5	...	...	2	......	...	...	...	...	...	1	2	...	1	1	1	...	......	...	13	...	...	26
West Orange	10	9	...	...	1	2	...	...	......	......	1	...	...	1	...	......	......	...	3	...	......	...	......	...	11	...	...	19
	1833	1792	48	7	149	574	16	68	264	400	90	89	41	13	73	262	273	13	86	65	111	13	150	25	821	86	60	3711

*No returns.

Deaths in Gloucester County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																								
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Clayton	17	13	...	...	...	6	...	2	...	1	1	1	1	...	...	...	...	...	...	...	...	...	2	1	15	...	...	30
Deptford	13	6	...	...	1	5	...	...	3	...	...	4	...	1	...	...	...	...	...	...	1	...	...	...	4	...	...	19
Franklin	10	12	...	1	1	5	...	...	...	...	1	...	...	...	...	...	...	...	1	2	...	...	1	...	10	...	...	22
Greenwich	13	8	...	...	...	6	...	...	1	...	...	1	...	...	1	...	...	...	...	1	...	...	...	1	3	...	7	21
Glassboro	10	16	...	...	2	7	...	...	3	1	1	2	...	...	...	...	...	...	...	1	...	...	...	...	9	...	...	26
Harrison	9	10	1	...	1	6	...	...	...	...	...	1	1	...	...	...	...	...	2	...	...	...	2	...	3	...	...	19
Logan	6	5	...	...	...	3	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	2	3	...	1	11
Mantua	12	9	...	...	...	2	1	1	...	1	...	3	...	...	...	...	...	...	...	...	1	...	1	...	10	...	1	21
Monroe	1	5	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	6
*Swedesboro	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Washington	8	9	1	...	...	2	...	...	...	...	3	...	...	...	...	...	...	...	...	...	1	...	1	...	5	...	4	17
West Deptford	10	4	1	1	2	...	...	2	...	...	...	1	1	...	...	...	...	...	...	2	...	...	...	...	3	3	4	17
Woodbury	18	18	...	...	1	4	...	1	2	1	2	2	1	...	...	...	...	...	1	3	2	...	...	...	14	1	3	37
Woolwich	7	13	...	...	2	4	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...	...	1	...	10	...	...	20
	134	128	3	2	10	52	1	6	9	4	8	17	4	1	2	...	...	...	5	11	5	...	8	4	93	4	21	266

*No return.

Deaths in Hudson County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilous Fever	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Bayonne	......		2		3	7	2	3	9	4	10	2	...	1	3	...	2	3	...	1	8	...	...	3	18	81	...	81
*Guttenburg	......				...	......	...	...	..		......	......	...	...	...	...	......	...	...	...	......	...	...	...	......	......	...	......
Harrison	......				2	19	2	2	16	6	9	5	...	...	4	1	3	...	...	...	13	...	...	...	23	105	...	105
Hoboken	......		9	4	13	32	13	20	36	27	47	13	5	12	19	12	18	13	7	17	23	3	14	12	113	482	...	482
Jersey City	......		29	8	38	171	27	43	147	113	159	82	6	11	53	34	69	37	26	38	59	7	38	47	372	1624	...	1624
Kearney	......			...	...	4	..	1	2	2	3	1	...	...	...		......	...	...	1	3	...	...	...	......	17	...	17
North Bergen	......			...	2	22	..	2	11	5	12	4	...	...	2		3	...	...	4	5	...	...	2	21	107	...	107
Town of Union	......			...	2	7	1	...	4	3	6	1	...	...	3		2	...	...	2	6	...	1	2	15	55	...	55
Union	......			...	3	5	2	6	4	3	2	......	...	...	1		1	...	...	1	2	...	1	1	12	44	...	44
Weehawken	......			...	1	2	..	...	3	..	4	......	...	...	...		2	...	...	...	3	...	...	...	5	21	...	21
West Hoboken	......			...	...	5	..	...	6	2	3	2	...	...	2		1	...	...	2	6	...	1	1	24	55	...	55
	......		42	12	64	274	47	77	238	165	255	110	21	24	87	47	101	53	33	66	138	10	55	69	603	2591	...	2591

*No return.

Deaths in Hunterdon County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Alexandria	12	10	...	5	3	5	...	...	...	...	...	...	1	...	...	...	...	...	3	...	...	...	...	...	5	...	...	22
Bethlehem	9	7	1	...	2	1	...	...	...	...	...	2	...	...	...	1	...	...	...	...	...	...	1	...	4	...	4	16
Clinton	7	6	...	...	...	1	...	...	2	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...	7	...	...	13
Delaware	20	12	...	...	1	6	...	1	...	1	1	2	...	...	1	...	...	...	4	...	...	...	...	...	13	...	2	32
East Amwell	11	10	...	...	1	4	...	...	2	...	...	1	...	...	...	...	...	...	...	2	...	...	1	...	10	...	...	21
Franklin	7	7	...	1	...	2	...	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	4	...	4	14
Frenchtown	4	2	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	4	...	...	6
High Bridge	8	8	...	...	1	1	...	...	1	...	2	1	1	...	...	...	...	...	...	...	1	...	2	...	6	...	...	16
*Holland	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kingwood	8	9	1	...	...	1	...	...	1	...	...	3	...	...	...	...	...	...	2	1	...	...	...	...	8	...	...	17
Lambertville	33	26	...	...	4	6	...	2	9	4	6	3	...	...	1	...	...	...	4	2	...	...	...	1	15	...	2	59
Lebanon	8	9	...	...	...	2	...	...	1	...	...	...	...	...	...	...	1	...	2	...	...	...	7	...	4	...	...	17
Raritan	8	8	2	...	...	5	...	...	1	...	...	1	...	...	...	...	...	...	3	...	...	...	...	1	3	...	...	16
Readington	9	13	1	...	2	4	...	...	1	...	1	2	...	...	...	...	...	...	3	...	...	...	...	...	8	...	...	22
Tewksbury	12	5	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	3	1	...	...	6	...	4	...	1	17
*Town of Clinton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Union	3	1	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	4
West Amwell	3	6	...	...	1	1	...	...	1	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	9
	162	139	5	6	15	41	...	3	21	7	15	17	3	1	2	1	1	...	25	7	1	...	17	2	98	...	13	301

*No return.

Deaths in Mercer County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All Others.	Sex not reported.	Cause not reported.	Total.
Chambersburg	25	22	......	......	2	6	3	6	1	2	7	...	......	......	...	1		5	...	1	1	......	2	......	10	......	......	47
*East Windsor	......	...	......	......	...	...	...	...	...	...	...	...	......	......	...			...	...	...	...	......	......	......	...	......	......	......
Ewing	6	11	......	......	1	1	...	...	...	1	2	2	......	......	...		..	1	2	...	...	......	......	1	3	1	4	18
Hamilton	51	24	......	......	1	13	...	2	1	4	2	...	2	2	2	4	2	...	2	2	1	......	4	......	31	......	......	75
*Hopewell	......	...	......	......	...	...	...	...	...	...	...	...	......	......	...		..	...	...	...	...	......	......	......	...	......	......	......
Lawrence	20	22	......	......	1	7	1	2	...	1	2	2	......	......	1		..	2	2	...	1	......	......	2	16	......	2	42
Princeton	12	14	1	......	1	2	...	...	...	1	1	...	......	......	...		..	...	1	1	...	......	......	......	17	......	1	26
*Trenton	......	...	......	......	...	...	...	...	...	...	...	...	......	......	...		..	...	...	...	...	......	......	......	...	......	......	......
Washington	10	3	1	2	...	1	...	...	...	3	2	2	......	......	...		..	...	1	...	..	......	......	......	1	......	......	13
West Windsor	5	9	......	......	1	5	...	...	...	...	...	1	......	......	...		..	...	1	1	...	......	......	......	4	......	1	14
* No returns.	129	05	2	2	7	35	4	10	2	12	16	7	2	2	3	5	2	8	9	5	3	......	6	3	82	1	8	235

Deaths in Middlesex County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																								
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Childbed.	Croup.	Cholera Infantum.	Convul-ions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Cranbury	10	6	...	...	...	8	...	...	1	...	...	1	1	...	...	...	...	...	2	...	...	...	...	...	4	1	...	17
East Brunswick	24	32	2	...	6	5	1	1	...	1	6	...	3	...	1	...	...	...	...	1	6	...	...	1	20	...	2	56
*Madison	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Monroe	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*New Brunswick	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
North Brunswick	9	7	...	...	1	1	1	...	3	...	...	1	...	...	...	...	...	...	1	1	3	...	...	...	4	...	...	16
*Perth Amboy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Piscataway	13	10	...	...	1	4	...	...	...	2	...	...	...	...	...	1	2	...	...	...	...	...	...	...	4	...	9	23
Raritan	40	33	...	...	3	6	...	2	2	...	14	2	...	...	2	1	...	...	...	5	3	...	2	2	29	...	...	73
Sayreville	3	6	...	...	...	1	...	...	...	...	4	...	...	...	...	...	...	...	...	...	3	...	...	...	1	...	...	9
South Amboy	41	34	...	1	7	9	1	4	4	9	4	2	...	...	...	...	1	1	2	...	19	...	...	...	11	...	...	75
South Brunswick	21	11	...	...	4	1	1	...	...	...	1	2	...	...	...	...	1	2	...	1	...	...	1	...	17	...	1	32
*Woodbridge	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	161	139	2	1	22	35	4	7	10	12	29	8	4	...	3	2	4	3	5	8	34	...	3	3	90	1	12	301

*No return.

Deaths in Monmouth County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported	Total.
Atlantic	4	2			1														2								3	6
Eatontown	5	7		1		2		2			1	2			2				4	2			2	1	2			22
Freehold	0	4		1	1	2				1	1												1		4		3	14
Holmdel		1																									1	1
Howell	6	11				2						1									4				1		9	17
Manalapan	0	11			1	3					2	1			1	1			3	1					6		2	21
*Marlboro																												
Matawan	25	18		1	1	7				1	2	2							2	1	5		1	1	18			43
*Middletown																												
*Millstone																												
*Ocean																												
Raritan	38	25	2		2	4		3	3		4	4			1	2			2	1	3				19		3	63
*Shrewsbury																												
Upper Freehold	31	6		1		11	1	1			2	1							2						15		2	47
*Wall																												
	139	95	2	4	6	31	1	6	3	2	12	11			4	4			15	6	22		4	2	65		33	234

*No return.

Deaths in Morris County.

TOWNSHIPS.	SEX. Male.	SEX. Female.	Apoplexy.	Bilious Fever.	Casualty	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diptheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Wooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Boonton	12	12				2				1	1	2	1		1						3				12		1	24
Chatham	15	9	1			2						1			1					2			1		16			24
*Chester																												
*Hanover																												
Jefferson	5	12				3					4	1							1						5		3	17
Mendham	10	7		1		6	1												1	2					3		3	17
Montville	7	4				1		2			1										3				2		2	11
Morris	100	85	3		2	29	1	3	9	5	12	7	5	3	2	2	3	1	9	3	5		3		58	6	26	191
Mount Olive	9	7			3	2		1			1		1		1						2				5			16
Passaic	14	4			1	4			1	2							1			3			1		4		1	18
Pequannock	3	6				1				1														1	3		2	9
*Randolph																												
Rockaway	27	22			2	2	1	2	1	5	3	1	4	2			3			3	5		4	3	2		6	49
*Roxbury																												
*Washington																												
	202	168	4	1	9	52	3	8	1	14	22	12	1	5	5	2	7	1	11	13	18	......	9	4	110	6	44	376

*No return.

Deaths in Ocean County.

TOWNSHIPS.	SEX. Male.	SEX. Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Berkeley	7	10	...	...	...	4	...	...	...	...	2	...	...	...	1	...	...	...	...	2	5	...	...	...	3	...	...	17
*Brick	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dover	36	20	1	...	3	12	...	...	5	...	1	1	...	...	...	...	...	...	1	3	10	...	4	...	15	...	...	56
*Eagleswood	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Jackson	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
*Lacey	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Manchester	4	14	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13	...	...	...	1	...	2	18
*Ocean	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Plumsted	15	20	1	...	...	6	...	...	4	3	...	1	2	...	...	...	...	...	2	...	5	...	4	...	7	...	...	35
Stafford	9	2	...	1	...	1	...	...	...	...	2	...	...	...	...	...	...	...	...	1	...	...	1	...	3	...	2	11
Union	7	9	...	1	...	7	...	...	...	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	5	...	...	16
	78	75	2	2	3	32	...	...	9	4	5	3	2	...	1	1	...	...	3	6	33	...	9	...	34	...	4	153

* No returns.

Deaths in Passaic County.

TOWNSHIPS.	SEX. Male.	SEX. Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Acquackanonk	6	7	....		2	1	....	....	1	......		1	....	....	....		......	......	1	....	....	......	......	......	6	......	......	13
*Little Falls	......	......	....		....	......	....	....	....	......		....	....	....	....		......	......	....	....	....	......	......	......			......	......
*Manchester	......	......	....		....	......	....	....	....	......		....	....	....	....		......	......	....	....	....	......	......	......			......	......
*Passaic	......	......	....		....	......	....	....	....	......		....	....	....	....		......	......	....	....	....	......	......	......			......	......
Paterson	495	489	9	4	38	128	18	33	40	43	183	21	13	5	15	37	41	6	34	14	64	8	12	7	204		7	984
Pompton	12	7	2		1	2	1	....	1	......		....	....	2	....		......	......	....	....	....	......	......	......	6		4	19
Wayne	6	8	....	......	1	1	....	....	....	......		2	....	....	....		......	......	1	1	2	......	......	......	4		1	14
West Milford	7	9	1	......	....	1	....	....	....	......		2	3	....	....		......	......	1	1	....	......	......	......	7		......	16
	526	520	12	4	42	133	19	33	42	43	185	26	16	7	15	37	41	6	37	16	66	8	12	7	227		12	1046

*No return.

Deaths in Salem County.

TOWNSHIPS.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																								
	Male.	Female.	Apoplexy.	Bilious Fever.	Casualty	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Smal Pox	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
*Elsinboro																												
Lower Alloways Creek	6	4				1			4			1						1							3			10
Lower Penns Neck	8	9			4	3				1		1							2				2		4			17
Mannington	16	18		1		9				3									1	3			1		7		9	34
Pilesgrove	13	37	1			14	2		4	1		3							4	1			8		9	2	4	52
Pittsgrove	7	15				8					2												1		6		4	22
Quinton	3	4				4															1				2			7
Salem	23	30			2	8			2	1	1	3			1			1	2	1			5	1	23		1	53
Upper Alloways Creek	2					1			1																			2
Upper Penns Neck	25	20			3	9	1	1	2			2							1	2	1		7		16			45
Upper Pittsgrove	10	8				2			2	1		1							3				2		7			18
	113	145	1	1	0	59	3	2	15	7	3	11	1		1	......		2	13	7	2	......	26	1	77	2	18	260

*No return.

Deaths in Somerset County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Bedminster	16	15	......	1	1	8	1	1	4	......	1	3	......	......	1	......	......	......	2	1	......	......	......	......	7	4	4	35
Bernards	18	15	......	......	......	6	1	......	1	......	......	3	2	......	1	......	1	......	2	4	1	......	......	......	11	......	......	33
*Branchburg	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Bridgewater	52	51	1	......	10	18	......	......	3	......	3	......	......	1	......	......	1	......	8	2	......	......	1	1	20	......	34	103
Franklin	23	16	......	1	6	7	......	1	2	......	......	1	......	......	2	......	3	......	2	1	1	......	2	......	10	......	......	39
Hillsborough	23	21	......	......	4	5	......	......	3	1	3	2	......	......	1	......	1	......	7	3	......	......	1	1	12	......	......	44
Montgomery	12	13	......	......	1	1	......	......	2	......	1	2	1	......	......	1	......	1	1	......	......	......	......	1	13	......	......	25
North Plainfield	16	9	......	......	2	7	......	......	2	1	......	1	......	......	......	......	......	......	......	......	......	......	1	......	8	......	3	25
Warren	7	5	1	1	......	3	......	......	2	1	......	1	......	......	......	......	......	......	......	1	......	......	......	......	2	......	......	12
	167	145	2	3	24	55	2	2	19	3	8	13	3	1	5	1	6	1	22	12	2	......	5	3	83	4	41	316

*No return.

Deaths in Sussex County.

TOWNSHIPS.	SEX. Male.	SEX. Female.	Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
			CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
Andover	3	7	1	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	...	2	...	...	10
Byram	11	5	...	...	3	1	...	...	...	...	...	1	1	...	...	...	1	...	1	...	...	...	2	...	6	...	...	16
Frankford	19	17	...	...	...	5	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	6	3	26	39
Greene	6	7	...	2	...	2	...	...	...	...	6	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	13
*Hardyston	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hampton	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
*Lafayette	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Montague	3	4	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	2	7
*Newton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sandyston	4	2	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	2	6
Sparta	20	16	...	...	1	4	...	2	2	...	2	1	...	...	...	...	...	...	4	...	4	...	...	...	13	...	3	36
Stillwater	10	9	...	...	1	4	...	...	...	...	3	1	...	...	1	...	1	...	1	...	...	...	1	...	5	...	1	19
*Vernon	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Walpack	9	6	...	...	2	3	...	...	...	1	...	...	...	...	...	...	2	...	...	...	...	...	1	...	6	...	...	15
Wantage	14	13	...	...	...	3	1	...	...	...	6	1	...	...	...	...	...	...	...	...	...	...	...	...	14	...	2	27
*No return.	99	87	1	2	8	26	1	2	2	1	19	5	1	...	1	...	5	...	11	...	8	...	5	...	53	3	38	189

Deaths in Union County.

TOWNSHIPS.	SEX. Male.	SEX. Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
*Clark		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...
*Cranford		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			...	...	...	...	...	...	...	...	...	...
Elizabeth	424	446	12		34	99	8	30	61	69	54	26	17	12	9	10	26	5	12	19	35	7	9	18	256	...	32	870
Fanwood	1	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...			...	...	...	...	...	...	...	...	2	3
Linden	3	3	...	1	...	1	...	...	...	1	...	...	...	...	1	...			1	...	...	...	...	...	1	...	...	6
*New Providence		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			...	...	...	...	...	...	...	...	...	...
Plainfield	34	34	3	...	1	27	...	...	...	...	2	1	..	1	...	...			1	3	2	...	...	...	19	...	8	68
Rahway	62	65	2	4	3	12	1	2	7	4	6	4	...	...	5	1	3		3	3	4	...	6	2	30	...	25	127
Springfield	6	3	...	...	1	2	...	...	...	...	...	2	...	...	...	...			2	...	...	...	...	...	2	...	...	9
*Summit		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Union		12	...	...	1	...	3	...	1	1	...	2	...	1	...	...	...	...	3	1	3	...	1	...	5	...	1	23
Westfield	13	16	...	...	...	5	...	...	...	...	12	...	...	...	1	...	...	...	2	1	1	...	...	2	5	...	...	29
	554	581	17	5	40	147	12	32	69	75	74	35	17	14	16	11	29	15	24	27	45	7	16	22	318	...	68	1135

*No returns.

Deaths in Warren County.

TOWNSHIPS.	SEX. Male.	Female.	CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE. Apoplexy.	Bilious Fever.	Casualty.	Consumption.	Child Bed.	Croup.	Ch'l'a Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflammation of Bowels.	Inflammation of Brain.	Inflammation of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small Pox.	Typhus Fever.	Whoop'g Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Allamuchy	6	4																							3		7	10
*Belvidere		......																									......	......
Blairstown	9	6	1			1					4		1							1					7			15
Franklin	3	6																									7	9
Frelinghuysen	2	8			1	2													3						4			10
Greenwich	9	18		2	3	3				2		3							1					2	0		1	27
Hackettstown	10	11				7	1	5				1													7			21
Hardwick	4	......																							4			4
Harmony	8	4				1		2	1			1													5			12
Hope	5	8		1		3		1			1	2					2								2		1	13
*Independence	...	......																										......
Knowlton	7	0				1		1			1						1		1	1	2		2		6		1	17
Lapatcong	15	9				2	2			4	3				1				1				3		7			24
Mansfield	19	5	1	1		6		1				3	1				1		2	1			4		9		2	34
*Oxford	......																											......
Pahaquarry	2	1					1																		1		1	3
*Phillipsburg	......																											......
Town of Washington	1	10		1		3			1						1				1						2		2	11
Washington	6	7			1				3			1							4	4								13
	106	117	2	5	5	29	4	10	7	8	9	11	2	...	2	......	4		14	7	2		9	3	68	......	22	223

*No return.

RECAPITULATION—Deaths in the Several Counties.

COUNTIES.	SEX.		CAUSES OF DEATH, AND NUMBER FROM EACH CAUSE.																									
	Male.	Female.	Apoplexy.	Bilious Fever	Casualty.	Consumption.	Child Bed.	Croup.	Cholera Infantum.	Convulsions.	Diphtheria.	Dropsy.	Dysentery.	Erysipelas.	Inflam'n of Bowels.	Inflam'n of Brain.	Inflam'n of Lungs.	Measles.	Old Age.	Paralysis.	Scarlet Fever.	Small-pox.	Typhus Fever.	Whooping Cough.	All others.	Sex not reported.	Cause not reported.	Total.
Atlantic	100	83	2		5	37	4	1	5	5	7	4	1	...	1	1	2	3	4	3	36	...	2	1	45	......	13	183
Bergen	164	149	5		16	49	2	5	11	2	26	10	17	2	12	.....	4	.....	10	12	18	...	3	.....	05	26	19	339
Burlington	269	259	4	2	14	115	3	20	35	14	43	7	...	1	5	5	.....	.....	21	21	33	...	15	.....	139	5	36	533
Camden	408	357	19		29	162	8	24	63	71	85	31	10	10	25	8	19	16	7	21	34	7	39	16	400	383	44	1148
Cape May	56	50	4		3	19	2	2	1		20	10	...	...	1	.....	.....	.....	6	1	.....	...	4	.....	24	2	10	108
Cumberland	215	214	1	6	15	91	5	2	37	8	16	13	6	1	5	1	3	10	18	12	4	...	14	6	91	8	72	437
Essex	1833	792	48	7	149	574	16	68	264	400	90	89	41	13	73	262	273	3	86	65	111	13	150	25	821	86	60	3711
Gloucester	134	128	3	2	10	52	1	6	9	4	8	17	4	1	2	.....	.....		5	11	5	...	8	4	93	4	21	266
Hudson	......	.....	42	12	64	274	47	77	238	165	255	110	21	24	87	47	101	53	33	66	138	10	55	69	603	2591	...	2591
Hunterdon	162	139	5	6	15	4	.. ..	3	21	7	15	17	3	1	2	1	1		25	7	1	...	17	2	98	......	13	301
Mercer	129	105	2	2	7	35	4	10	2	12	16	7	2	2	3	5	2	8	9	5	3	...	6	3	82	1	8	235
Middlesex	161	139	2	1	22	35	4	7	10	12	29	8	4	...	3	2	4	3	5	8	34	...	3	3	90	1	12	301
Monmouth	139	95	2	4	6	3	1	6	3	2	12	11	...	...	4	4	1		15	6	22	...	4	2	65	......	33	234
Morris	202	168	4		9	52	3	8	11	14	22	12	11	5	5	2	7	1	11	13	18	...	9	4	110	6	44	376
Ocean	78	75	2	2	3	32	.....	.....	9	4	5	3	2	...	1	1	.....		3	6	33	...	9		34	......	4	153
Passaic	526	520	12	4	42	133	19	33	42	43	185	26	16	7	15	37	41	6	37	16	66	8	12	7	227	......	12	1046
Salem	113	145	1	1	10	59	3	2	15	7	3	11	1	...	1	.....	.....	2	13	7	2	...	26	1	77	2	18	260
Somerset	167	145	2	3	24	55	2	2	19	3	8	13	3	1	5	1	6	1	22	12	2	...	5	3	83	4	41	316
Sussex	99	87	1	2	8	26	1	2	2	1	9	5	1	...	1	.....	5	.....	11	.....	8	...	5	...	53	3	38	189
Union	554	581	17	5	40	147	12	32	69	75	74	35	17	14	16	11	29	15	24	27	45	7	16	22	318	......	68	1135
Warren	106	117	2	5	5	29	4	10	7	8	9	11	2	...	2	.....	4	.....	14	7	2	...	9	3	68	.....	22	223
	5615	5348	80	68	496	2048	141	320	873	867	947	450	162	82	269	388	502	131	379	326	615	45	411	171	3626	3122	588	14,085

DEATHS.

Deaths in Atlantic County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.		
Absecon	7	......	1	1	1	1	2	1	1	......	......	......	1	**16**
*Atlantic City	......	......	......	...	...	...	......	...	...	......	......	......	...	......
*Buena Vista	......	......	......	...	...	...	......	...	...	......	......	......	...	......
Egg Harbor City	10	4	1	3	1	3	......	3	...	......	......	......	2	**27**
Egg Harbor Township	11	1	1	4	6	2	1	1	1	......	......	......	8	**36**
Galloway	7	......	3	3	2	3	1	4	3	3	......	......	1	**30**
Hamilton	12	1	1	...	2	2	1	2	1	......	......	......	3	**25**
Hammonton	16	6	2	...	1	...	5	2	4	2	1	......	1	**40**
Mullica	1	1	3	...	1	...	......	...	...	......	......	......	...	**6**
Weymouth	......	......	......	...	...	...	......	...	1	1	......	......	1	**3**
*No return.	64	13	12	11	14	11	10	13	11	6	1	......	17	**183**

Deaths in Bergen County.

TOWNSHIPS.	AGES.													
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Englewood	25	5	1	2	2	3	4	...	....	....	...		....	42
Franklin	2	..	......	1	2	......	2	3	2	2	....		....	14
Harrington	20	1	3	2	......	4	4	2	6	2	....		....	44
Hohokus	...	..	......	......	1	1	...	...	....	....	2		....	4
Lodi	13	..	......	10	5	1	1	3	2	....	....	......	5	40
Midland	10	5	1	3	4	1	5	6	2	4	1	......	1	43
New Barbadoes	8	2	6	5	3	4	5	2	6	4	2	......	10	57
Palisade	2	2	1	......	1	......	–	1	....	....	....		....	8
Ridgefield	3	2	......	2	......	1	3	3	2	1	....		4	21
Ridgewood	1	2	1	......	......	1	....	....	....	....	....		....	5
Saddle River	2	..	......	......	1	2	....	2	2	....	....		....	9
Union	19	4	5	2	6	3	3	4	1	2	....		3	52
*Washington	......	..	......	......	......	......	....	....	....	....	....		....	......
	105	23	18	27	25	21	28	26	23	15	5		53	339

*No return.

Deaths in Burlington County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.		
*Bass River	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Beverly City	......	......	......	......	......	...	...	...	...	...	...	......	......	......
Beverly	6	2	1	1	3	...	...	1	3	...	1	......	......	18
Bordentown	68	13	7	17	10	13	11	9	10	6	4	......	7	175
Burlington	50	10	6	11	13	14	9	12	9	3	...	......	......	137
*Chester	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Chesterfield	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Cinnaminson	......	......	......	......	......	...	...	...	...	...	...	......	......	......
Evesham	6	......	......	......	......	1	3	1	2	...	...	......	......	13
*Florence	......	......	......	......	......	...	...	...	...	...	...	......	......	......
Little Egg Harbor	9	5	5	2	3	1	2	1	...	...	...	......	1	29
Lumberton	9	1	1	1	6	5	...	1	2	...	...	......	......	26
*Mansfield	......	......	......	......	......	...	...	...	...	...	...	......	......	......
Medford	7	3	4	4	2	1	2	3	6	2	...	......	4	38
*Mount Laurel	......	......	......	......	......	...	...	...	...	...	...	......	......	......
New Hanover	7	1	1	......	1	3	2	2	3	3	...	......	......	23
Northampton	16	4	2	3	3	3	5	8	9	4	1	......	7	65
*Pemberton	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Randolph	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Shamong	......	......	......	......	......	...	...	...	...	...	...	......	......	......
Southampton	2	2	......	1	......	1	...	1	...	...	...	......	2	9
*Springfield	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Washington	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Westhampton	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Willingboro	......	......	......	......	......	...	...	...	...	...	...	......	......	......
*Woodland	......	......	......	......	......	...	...	...	...	...	...	......	......	......
	180	41	27	40	41	42	34	39	44	18	6	......	21	533

*No return.

Deaths in Camden County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 0.	0 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.		
Camden	415	68	46	53	52	49	46	51	41	43	5		37	906
Centre		2	2	6	2	2	1	1	2	2	....		2	33
Delaware	4	2	1	......	3		1	2	....	1	....		....	14
Gloucester	17	......	2	3	5	3	2	6	7	4	....	......	3	52
Gloucester City	15	......	1	4	4	1	...	2	1	....	....	......	....	28
Haddon	15	1	4	4	2	1	7	3	4	1	2	......	2	46
Merchantville	1	3	......	......	..	1	..	....	....	....	....	......	....	5
Stockton	4	......	1	1	..		1	....	1	....	....	......	1	9
Waterford	16	1	3	2	3	4	2	4	2	2	1	......	3	43
Winslow	5	......	1	......	1	......	..	2	2	....	....	......	1	12
	503	77	61	73	72	61	60	71	60	53	8	......	49	1148

Deaths in Cape May County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.		
*Cape May City	....	......	......	......	......	......	....	....	....	....	....	......	....	......
Dennis	3	......	2	4	2	2	2	4	4	....	....	......	6	29
Lower	8	11	3	4	1	2	6	2	2	1	....	......	4	44
Middle	3	3	2	2	1	1	....	...	2	3	....	......	2	19
Upper	4	......	3	1	......	1	3	1	1	1	1	......	....	16
	18	14	10	11	4	6	11	7	9	5	1	......	12	108

*No returns.

Deaths in Cumberland County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Bridgeton	46	3	9	10	0	9	7	17	12	8	3	1	....	135
Commercial	8	1	2	3	1	1	1	4	1	1	...	....	2	25
Deerfield	5	...		1	......	1	...	...	...	...	...	....	....	8
*Downe	......	...		..		... ..	...	...	...	...	...	....	....	......
Fairfield	7	1	2	2	4	1	...	1	3	1	...	....	3	25
Greenwich	7	1		1	1	......	...	...	1	1	....	....	1	14
Hopewell	5	1	2	..	4	......	4	1	9	5	....	1	1	33
Landis	11	10	2	5	5	4	1	2	2	1	....	....	2	45
Maurice River	12	......	1	.		5	2	2	1			....	....	25
Millville	46	3	8	13	3	7	5	7	6	2	....	....	9	119
Stoe Creek	2	2	......	...	1		...	1	...		....	....	2	8
*No return.	149	22	28	36	40	28	20	35	35	9	3	2	20	437

Deaths in Essex County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
*Belleville		..	......	....	......	......	......	......	......	....			......	......
Bloomfield	9	3	3	4	9	5	2	2	4	4	....		1	56
Caldwell	7	5	2	1	3	2	2	6	5	1	....		6	40
Clinton	9	4	1	......	2	1	2	2	2	3			......	26
East Orange	25	2	3	3	3	2	5	3	6	3			......	55
Franklin	9	..	......	......	......	......	4	4	1	....			......	18
Livingston	1	1	......	......	1	......	3	2	1	....			......	9
Millburn	5	2	1	3	5	2	3	2	5	1			1	30
Montclair	12	1	5	1	4	2	2	7	4	3			5	46
Newark	1250	350	253	229	236	202	236	70	118	59	8	2	190	3303
Orange	29	8	4	5	9	13	4	4	2	2			3	83
South Orange	6	4	......	3	1	3	3	3	2	1	....		......	26
West Orange	5	1	......	3	3	1	2	......	2	1	1		......	19
*No return.	1377	381	272	252	276	233	268	205	152	78	9	2	206	3711

Deaths in Gloucester County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Clayton	12	1	2	4	1	2	1	4	2	1	......	......	....	30
Deptford	4	1	2	1	2	1	1	4	3	......	......	......	....	19
Franklin	6	2	......	3	3	....	1	4	3	......	......	......	....	22
Greenwich	9	1	......	2	3	....	1	1		......	......	......	3	21
Glassboro	6	1	1	2	3	1	5	3		1	2	......	....	26
Harrison	4	......	1	1	2	1	2	....	5	3	......	......	....	19
Logan	3	......	2	...	...	1	..	3	....	1	......	......	1	11
Mantua	6	......	....	2	..	2	1	2	6	1	1	......	....	21
Monroe	3	......	2	...	1	....	..	....	....	......	......	......	....	6
*Swedesboro	......	......	....,	...	..	....	..	....	....	......	......	......	....	......
Washington	1	3	1	...	1	1	1	3	....	......	......	......	6	17
West Deptford	5	1	1	2	..	....	1	2	2	......	......	......	3	17
Woodbury	14	2	1	2	3	2	1	4	5	......	.....	......	3	37
Woolwich	6	1	1	3	..	1	1	3	2	1	......	......	1	20
*No return.	79	13	14	22	9	12	6	33	30	8	3	......	17	266

Deaths in Hudson County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Bayonne	43	6	4	3	7	4	3	3	6	1	....		1	81
*Guttenburg	......	...	......	......	...	......	......	......	......	...	....		....	......
Harrison	44	12	7	10	12	5	6	3	4	2	....		....	105
Hoboken	203	42	29	34	49	27	29	36	19	11	3		....	482
Jersey City	797	102	88	103	107	104	99	93	76	39	7		9	1624
Kearney	7	3	......	2	1	1	1	1	1	....	...		....	17
North Bergen	40	11	4	7	15	10	7	6	3	4	....		....	107
Town of Union	25	3	2	4	3	10	2	2	1	2	1		....	55
Union	20	7	1	2	1	2	2	6	2	1	...		....	44
Weehawken	9	...	1	5	...	6	......	......	......	....	....		....	21
West Hoboken	22	4	......	2	8	8	2	2	5	2	....		....	55
*No return.	1210	90	136	172	203	177	151	152	117	62	11		10	2591

Deaths in Hunterdon County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 00.	Over 00.	Ages not reported.	Total.
Alexandria	2	...	3	3	2	1	......	6	3		..		......	22
Bethlehem	3	2	2		1	1	1	4	..		..		1	16
Clinton	6	...	1		2	...	1	1	1	1	......		......	13
Delaware	2	2	1	2	1	4	3	4	5	6	......		2	32
East Amwell	3	...	1	4	1	1	2	4	3	2	..		......	21
Franklin	5	...	1		...	2	......	..	2	3	..		1	14
Frenchtown	2	...	...	...	...	...	......	..	3	1	..		......	6
High Bridge	5	3	1	1	...	2		2	2	......	..		......	16
*Holland	...	...	...	...	...	..		..	......	......	..		......	......
Kingwood	2	...	...	1	1	..		4	6	3	..		......	17
Lambertville	27	1	1	3	4	1	5	5	5	2	1	1	3	59
Lebanon	4	2	2	1	...	2		1	2	2	1		......	17
Raritan	2	1	1	2	1	3	1	2	1	2	..		......	16
Readington	3	3	...	1	5	4	1	1	1	3	..		......	22
Tewksbury	2	...	1	1	2	1	6	..	3		1		......	17
*Town of Clinton	...	...	...	...	...	...	......	..	......		..		......	......
Union	...	...	...	...	1	...	......	..	3	......	......	......	......	4
West Amwell	3	1	3	1	...	...	......	..	......	1	......	......	......	9
*No return.	71	15	18	20	21	22	20	34	40	28	4	1	7	301

Deaths in Mercer County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.		
Chambersburg	20	10	7	4	2	2	....	1	1	....	....	......	....	47
*East Windsor	......	......	......	......	......	......	....	....	....	....	....	......	....	......
Ewing	3	......	3	1	......	......	...	1	1	....	1	......	8	18
Hamilton	13	6	8	6	9	5	7	7	6	6	....	......	2	75
*Hopewell	......	......	......	......	......	......	....	....	....	....	....	......	....	...
Lawrence	14	2	3	1	4	3	5	5	2	1	1		1	42
Princeton	6	......		1	2	3	2	6	4	2		......	....	26
*Trenton	......	......	......	......	......	......	....	....	....	....	....	......	....	......
Washington	3	1	3	1	......	......	2	2	....	1	....	......	....	13
West Windsor	1	......	2	......	1	1	3	....	2	2	1	......	1	14
*No return.	60	19	26	14	18	14	19	22	16	12	3	......	12	235

Deaths in Middlesex County.

TOWNSHIPS.	AGES.												Ages not reported.	Total.
	Under 5 years.	5 and under 10.	0 and under 20.	20 and under 30.	30 and under 40.	40 and und 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90	90 and under 100.	Over 100.		
Cranbury	2	......	.	3	2	1	3	2	2	1	...		1	17
East Brunswick	21	4	6	2	4	4	7	2	3	3	...		...	56
*Madison	......	......	......		......	......	...	...	...	...	...		...	......
*Monroe	......	......	......	......	......	......	...	...	...	...	...	......	...	......
*New Brunswick	......	......	......	......	......	......	...	...	...	...	...	......	...	......
North Brunswick	4	2	1	2	......	......	...	4	...	2	...	......	1	16
*Perth Amboy	......	......	......	......	......	......	...	...	...	...	...	......	...	......
Piscataway	10	......	3	1	1	1	2	4	...	...	...	......	1	23
Raritan	28	6	2	4	4	6	3	7	5	7	1	......	...	73
Sayreville	4	1	2	......	......	......	1	...	...	...	...	......	1	9
South Amboy	36	10	3	5	4	6	3	5	2	...	1	......	...	75
South Brunswick	3	......	3	4	2	5	1	5	6	1	...	......	2	32
*Woodbridge	......	......	......	......	......	......	...	...	...	...	...	......	...	......
*No return.	108	23	20	21	17	23	20	29	18	14	2	......	6	301

Deaths in Monmouth County.

WNSHIPS.	AGES. Under 5 years.	5 and under 0.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
ntic.............	3		......	......	1	......	1	....	..	..		1	....	6
ntown	3	2	5	1	2	......	2	2	2	2		......	1	22
hold	3		2	2	3	2	1	1	..	..		......	....	14
mdel	...		......	......	....	......	......	1	..	..		......	....	1
rell	...	3	3	3	2	......	......	2	1	..		......	3	17
alapan	4	2	4	......	1	2	......	2	5	1		......	...	21
rlboro.........	...		......	......	....	......	......	....	..	..		......	...	......
awan	13	5	4	3	2	2	6	4	2	2		......	...	43
ddletown	......	......	....	......	....	......	......	....	..	..		......	...	......
llstone.........	......	...	......	......	....	......	......	....	..	..		......	...	......
ean	...	...		......	....	......	......	....	..	..		......	...	......
itan.............	27	7	4	5	4	3	2	3	5	2	1	......	...	63
rewsbury	...	...		......	....	......	......	....	..	..		......	...	......
er Freehold..	10	1	7	1	2	4	2	4	7	5		......	4	47
ll	...	...		......	....	......	......	....	..	......	......	......	...	......
return.	63	20	29	15	17	13	14	19	22	12	1	1	8	234

Deaths in Morris County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Boonton	5	3	4	1	1	4	1	1	4	...	....	......	...	24
Chatham	4	......	2	1		3	......	6	5	2	....	......	1	24
*Chester	......	......	......	......		...	......		..	...	....	......	...	......
*Hanover	......	......	......	......		...	......		..	...	....	......	...	......
Jefferson	6	2	2	2		2	......	1	2	...	....	......	...	17
Mendham	3	......	1	1	2	......	1	4	5	...	....	......	...	17
Montville	3	3	......	......	1	......	......		3	1	....	......	...	11
Morris	63	13	7	12	5	13	9	22	14	9	4	......	10	191
Mount Olive	3	3	1	2	2	......	3	2	..	....	....	......	...	16
Passaic	4	......	......	2	1	1	2	2	3	1	1	......	1	18
Pequannock	3	......	1	4	......	......	......	......	..	1	....	......	...	9
*Randolph	......	......	......	......	......	......	......	......	..	....	....	......	...	......
Rockaway	27	3	3	4	2	2	2	2	4	....	....	......	...	49
*Roxbury	......	......	......	......	......	......	......	......	..	....	....	......	...	......
*Washington	......	......	......	......	......	......	......	......	..	....	....	......	...	......
	121	27	21	29	24	25	18	40	40	14	5	......	12	376

*No return.

Deaths in Ocean County.

NSHIPS.	AGES. Under 5 years.	5 and under 0.	0 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 00.	Over 100.	Ages not reported.	Total.
ey...........	1	3	2	2	1	......	1	2	2	3	......	......	......	17
....	......		...	......		......	......	......	...	...	......	......	......	......
....	[illegible]	8	5	6	7	1	3	3	3	3	......	......	......	56
swood......	......		...	......	..	......	......	......		...	......	......	......	......
on	......		...	......	..	......	......	......		...	......	......	......	......
....	......	......		......	..		......	......		...	......	......	......	......
ester	7	4	3		2		......	1	1	...	......		......	18
....	......	......	..		...	......	......	......	...	...	......		......	......
ed	19	2	1	3	4	......	......	2	3	1	......		......	35
l.............	4	1	1	1	...	......	......	......	2	2	......		......	11
....	6	......	1	4	1	......	1	......	1	2	......		......	16
rn.	54	18	13	16	15	1	5	8	12	11	......		......	153

Deaths in Passaic County.

NSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 00.	Ages not reported.	Total.
kanonk....	3	2	1	......	......	2	...	2	3	...	......		......	13
Falls......	......	......	......	......	......	......	...	...	...	...	..		......	......
hester	......	......	......	......	......	......	...	...	...		..		......	......
ic............	......	......	......	......	......	......	...	...	...		..		......	......
n............	462	120	52	69	60	50	39	40	44	5	7		26	984
n............	5	......	1	......	1	2	...	1	6	2	..		1	19
....	4	......	......	......	......	......	2	3	2	3	..	......	......	14
Milford......	4	2	......	1	......	......	...	2	6		1	......	......	16
rn.	478	124	54	70	61	54	41	48	61	20	8	......	27	1046

Deaths in Salem County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	0 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
*Elsinboro	......		......	......	..	......	...	...	...	...	...	......		......
Lower Alloways Creek	4		1	1	1	......	...	1	2	...	...	......	...	10
Lower Penns Neck	4		1	4	1	1	3	...	1	2	...	......	...	17
Mannington	10		......	4	5	1	2	3	1	3	1	......	3	34
Pilesgrove	12	2	3	6	6	3	4	8	3	2	1	......	2	52
Pittsgrove	4	......	1	5	2	1	...	2	2	1	...	......	4	22
Quinton	2	......	1	2	..	......	1	1	...	...	...	......	...	7
Salem	13	1	3	9	2	4	5	7	4	3	2	......	...	53
Upper Alloways Creek	1	......	......		......	......	...	...	...	...	...	......	...	2
Upper Penns Neck	10	4	1	8	3	2	2	2	2	1	...	......	10	45
Upper Pittsgrove	5	1	1		3	......	...	1	2	3	...	......	1	18
*No return.	65	9	12	41	23	12	17	25	17	15	4	......	20	260

Deaths in Somerset County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Bedminster	8	......	2	4	1	1	5	5	7	...	...	......	2	35
Bernards	5	1	1	4	5	4	4	4	4	...	...	......	1	33
*Branchburg	......	......		......	......	..	...	...	...	...	...	......	...	......
Bridgewater	24	9	8	10	13	10	9	8	6	5	...	......	1	103
Franklin	1	5	2	3	......	4	3	5	2	3	1	......	...	39
Hillsborough	2	1	2	4	2	2	3	3	6	7	1	......	1	44
Montgomery	0	......		2	4	......	2	...	6	1	...	......	...	25
North Plainfield	8	......	2	2	1	1	2	4	3	...	...	......	2	25
Warren	4	......	2	2	......	......	...	...	3	1	...	......	...	12
*No return.	82	16	9	31	26	22	28	29	37	17	2	......	7	316

Deaths in Sussex County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Andover	3	1	......	...	2	1	......	1	2	......	......	......	...	10
Byram	2	2	1	3	3	...	1	1	1	1	......	......	1	16
Frankford	14	2	2	1	1	3	2	6	6	2	......	......	...	39
Greene	3	4	1	...	...	2	......	2	1	......	......	......	...	13
*Hardyston	......	......	......	...	...	...	......	...	...	......	......	......	...	......
Hampton	......	......	1	...	...	...	......	...	...	......	......	......	...	1
*Lafayette	......	......	......	...	...	...	......	...	...	......	......	......	...	......
Montague	......	......	......	...	1	...	......	...	2	1	1	......	2	7
*Newton	......	......	......	...	...	...	......	...	...	......	......	......	...	......
Sandyston	......	1	1	1	1	1	......	...	1	......	......	......	...	6
Sparta	6	3	5	4	2	1	1	2	6	5	......	......	1	36
Stillwater	4	1	1	2	1	1	1	2	2	1	......	......	3	19
*Vernon	......	......	......	...	...	...	......	...	...	......	......	......	...	......
Walpack	4	......	......	2	1	1	2	4	...	1	......	......	...	15
Wantage	8	4	3	3	...	2	2	1	2	2	......	......	...	27
*No return.	44	18	15	16	12	12	9	19	23	13	1	......	7	189

Deaths in Union County.

TOWNSHIPS.	AGES.													
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
*Clark	...	..	...	......	......	......	......	...	...	...			..	......
*Cranford	...	..	...	......	......	......	......	...	...	...			..	......
Elizabeth	418	45	43	59	60	67	64	59	25	5			25	870
Fanwood	2	..	...	......	......	......	......	...	...	1			..	3
Linden	...	2	1	1	......	......	1	...	...	1			..	6
*New Providence	...	..	...	......	......	......	......	...	...	...			..	......
Plainfield	16	5	5	6	6	5	9	12	1	3			..	68
Rahway	44	7	4	7	7	10	12	10	15	3		......	7	127
Springfield	...	1	...	......	2	.....	......	2	2	1		......	1	9
*Summit	...	..	...	......	......	......	......	...	...	...		......	..	......
Union	13	1	...	1	......	......	1	1	4	2		......	..	23
Westfield	9	6	3	3	2	......	2	1	2	...		......	1	29
	502	67	56	77	77	82	89	85	49	16	1	......	34	1135

*No returns.

Deaths in Warren County.

TOWNSHIPS.	AGES. Under 5 years.	5 and under 0.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Allamuchy	...	...	...	...	...	...	...	...	...	4	...		6	10
*Belvidere	...	...	...	...	...	...	...	...	...	...	...		...	...
Blairstown	3	3	1	1	...	...	2	2	...	3	...		...	15
Franklin	...	...	2	...	...	...	1	...	2	...	...		4	9
Frelinghuysen	3	1	1	...	2	...	...	...	...	3			...	10
Greenwich	8	...	2	...	2	2	3	5	2	1			2	27
Hackettstown	5	2	...	2	6	4	1	...	1	...			...	21
Hardwick	...	...	...	...	...	...	...	...	2	...	1		1	4
Harmony	5	...	...	...	...	...	1	2	1	3			...	12
Hope	2	...	1	2	1	1	3	...	3	...			...	13
*Independence	...	...	...	...	...	...	...	...	...	...			...	...
Knowlton	3	2	1	2	2	1	1	2	1	2	...		...	17
Lapatcong	12	1	3	2	1	1	1	1	1	...			...	24
Mansfield	5	2	3	5	2	1	3	4	1	4	1		3	34
*Oxford	...	...	...	...	...	...	...	...	...	...			...	...
Pahaquarry	1	...	...	1	...	...	...	1	...	...			...	3
*Phillipsburg	...	...	...	...	...	...	...	...	...	...			...	...
Town of Washington	7	...	2	1	...	...	...	...	...	1	...		...	11
Washington	2	...	1	...	...	...	...	3	3	3	...		1	13
*No return.	56	11	17	16	16	10	16	20	17	24	3		17	223

RECAPITULATION.

DEATHS IN THE SEVERAL COUNTIES.

COUNTIES.	AGES.													
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 100.	Ages not reported.	Total.
Atlantic.........	64	13	12	11	14		0	13	11	6	1	...	17	1
Bergen..........	105	23	18	27	25	2	28	26	23	15	5	...	23	3
Burlington.....	180	41	27	40	41	42	34	39	44	18	6	...	21	5
Camden	503	77	61	73	72	61	60	71	60	53	8	...	49	11
Cape May.....	18	14	10	11	4	6	11	7	9	5	1	...	12	1
Cumberland ...	149	22	28	36	40	28	20	35	35	19	3	2	20	4
Essex	1377	381	272	252	276	233	268	205	152	78	9	2	206	37
Gloucester......	79	13	14	22	19	12	16	33	30	8	3	...	17	2
Hudson	1210	190	136	172	203	177	151	152	117	62	11	...	10	25
Hunterdon.....	71	15	18	20	21	22	20	34	40	28	4	1	7	3
Mercer..........	60	19	26	14	18	14	19	22	16	12	3	...	12	2
Middlesex......	108	23	20	21	17	23	20	29	18	14	2	...	6	3
Monmouth.....	63	20	29	15	17	13	14	19	22	12	1	1	8	2
Morris..........	121	27	21	29	24	25	18	40	40	14	5	...	12	3
Ocean...........	54	18	13	16	15	1	5	8	12	11	...	...	......	1
Passaic	478	124	54	70	61	54	41	48	61	20	8	...	27	1C
Salem	65	9	12	41	23	12	17	25	17	15	4	...	20	2
Somerset	82	16	19	31	26	22	28	29	37	17	2	...	7	3
Sussex	44	18	15	16	12	12	9	19	23	13	1	...	7	1
Union	502	67	56	77	77	82	89	85	49	16	1	...	34	11
Warren	56	11	17	16	16	10	16	20	17	24	3	...	17	2
	5389	1141	878	1010	1021	881	894	959	833	460	81	6	532	140

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RECAPITULATION.

DEATHS IN THE SEVERAL COUNTIES.

COUNTIES.	AGES.												Ages not reported	Total.
	Under 5 years.	5 and under 10.	10 and under 20.	20 and under 30.	30 and under 40.	40 and under 50.	50 and under 60.	60 and under 70.	70 and under 80.	80 and under 90.	90 and under 100.	Over 90.		
Atlantic	64	13	12	11	14	11	10	13	11	6	1	...	17	183
Bergen	105	23	18	27	25	21	28	26	23	15	5	...	23	339
Burlington	180	41	27	40	41	42	34	39	44	18	6	...	21	533
Camden	503	77	61	73	72	61	60	71	60	53	8	...	49	1148
Cape May	18	14	10	11	4	6	11	7	9	5	1	...	12	108
Cumberland	149	22	28	36	40	28	20	35	35	19	3	2	20	437
Essex	1377	381	272	252	276	233	268	205	152	78	9	2	206	3711
Gloucester	79	13	14	22	19	12	16	33	30	8	3	...	17	266
Hudson	1210	190	136	172	203	177	151	152	117	62	11	...	10	2591
Hunterdon	71	15	18	20	21	22	20	34	40	28	4	1	7	301
Mercer	60	19	26	14	18	14	19	22	16	12	3	...	12	235
Middlesex	108	23	20	21	17	23	20	29	18	14	2	...	6	301
Monmouth	63	20	29	15	17	13	14	19	22	12		1	8	234
Morris	121	27	21	29	24	25	18	40	40	14	5	...	12	376
Ocean	54	18	13	16	15	1	5	8	12	11		...	......	153
Passaic	478	124	54	70	61	54	41	48	61	20	8	...	27	1046
Salem	65	9	12	41	23	12	17	25	17	15	4	...	20	260
Somerset	82	16	19	31	26	22	28	29	37	17	2	...	7	316
Sussex	44	18	15	16	12	12	9	19	23	13		...	7	189
Union	502	67	56	77	77	82	89	85	49	16	1	...	34	1135
Warren	56	11	17	16	16	10	16	20	17	24	3	...	17	223
	5389	1141	878	1010	1021	881	894	959	833	460	81	6	532	14085

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Addenda.

The paper on Sewers is postponed until the next report.

In description of map, page 58, omit E, line 22, and E, line 23

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THIRD ANNUAL REPORT

OF THE

OARD OF HEALTH

OF THE

STATE OF NEW JERSEY

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STATE BOARD OF HEALTH.

HON. HENRY C. KELSEY, Secretary of State, } Members Ex-Officio.
HON. JOHN P. STOCKTON, Attorney General, }

	P. O. Address.
LABAN DENNIS	Newark.
CYRUS F. BRACKETT	Princeton.
JAMES M. RIDGE	Camden.
THEODORE R. VARICK	Jersey City.
EZRA M. HUNT	Metuchen.
E. A. OSBORN	Middletown.
A. R. LEEDS	Hoboken.

President	T. R. VARICK.
Corresponding Secretary	EZRA M. HUNT.
Recording Clerk	E. A. OSBORN.

REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency, George B. McClellan,

GOVERNOR:—The State Board of Health of the State of New Jersey begs leave to make report to your Excellency as follows:

The year which has just closed has been one of increased activity for this Board. Our citizens are realizing more and more that the public health is a great material interest over which the State must exercise oversight. Many of the causes that affect the physical condition of the population are within the sphere of its control. The sickness and death rate of the population are greatly influenced by localities, surroundings, density, modes of living and other circumstances. Social conditions, in the common interests of the citizen, need the advisory or regulative concern of the governing authorities. The State must acquaint itself with the avoidable burdens which localities, employments, conditions and circumstances cast upon the citizens, and study the relations of the individual so far as they most deeply concern the public welfare. The recognition of this principle led to the formation of a Health Board. Each year has thus far accumulated new evidence of its importance, while evidence of its appreciation by the people is afforded by the increasing calls upon it for information and advice.

The past year has been one exempt from any wide-spread epidemic. As far as inference can be made from the general reports of sickness in previous years, it is believed to have been a period of unusual health.

The report of the Board last year in reference to the epidemic of typhoid fever at Jamesburg, as well as the report of the Trustees as to existing defects led to an appropriation by the Legislature which provided for important changes as to sewerage, drainage and water supply, as well as for better hospital accommodations and an increase of apartments, so as to prevent over-

crowding. Your Excellency, in March last, directed the Board of Health to put itself in communication with the Superintendent and Trustees of the School, so as to advise with them in reference to improvements deemed desirable. We are glad to be able to report that a thorough reconstruction has been carried out; that a new family house has been erected; a hospital building provided, a new water supply secured, and such precautions taken as we trust will prevent the recurrence of any such preventible disease as afflicted the institution the last year. While the plans and work have necessarily been executed under the supervision of special architects and engineers, the sanitary views of the Board were adopted so far as financial resources would permit.

As the Legislature last year appointed a commission to consider what general laws could be advised for the government of cities, the Board of Health responded to an invitation to appear before the commission and present arguments for general laws and ordinances, which should secure to every city or borough a Board of Health, with such powers as would enable it to exercise needed jurisdiction where the public health was imperilled.

As we have examined into the health codes of our cities and became aware of the entire absence of any well-regulated sanitary administration in many of them, we have been convinced of the need of such legislation as is already fully sustained in other States and cities, and as should be required in all towns upon which municipal privileges are conferred. The commission seemed fully alive to the need of some action and have the whole subject under careful advisement.

As a part of this report will be found the letter presented to the Commission by the Board.

The Board is able to record with pleasure the evident increase of interest there is among the people at large in sanitary affairs. The discussion that is now taking place as to the best methods to be used, the frequent articles in the public press, the formation of voluntary associations in some of our cities, indicate that the people are becoming sensitive about this great social and State interest. The circulation of the Health Reports has been quite general through the State, and the demand for them is upon the increase.

During the summer it was thought necessary to issue a Health Circular, addressed to householders, city authorities and boards of health. (See Appendix.) It sought within a brief compass not only to give advice, but to direct as to methods for improving household and other local conditions, and to give in precise form directions as to the use of those alteratives or disinfectants which might be needed. This circular by thousands has found its way into the families of the State, and we have occasion to know it has been serviceable as a ready directory in some of the details of health administration.

SANITARY APPLIANCES.

In household administration and in the necessities of congregated life, as found in cities, very many appliances are needed in connection with the care and delivery of household offaling and debris. Drainage, sewerage and water-carriage devices, filters, traps, earth closets, ventilators, disinfectants, represent a few of the hundreds of articles offered to expedite household or municipal delivery in the interests of the public health. These inventions have become so numerous in England that a great sanitary exhibit is held each year, lasting ten days, and attracting large attention, because of the advantage it affords for examining sanitary contrivances, and testing and comparing their merits and securing the opinions of experts in regard to their value. The State Board of Health, believing that such an exhibit would be of great service to our citizens in connection with the annual fair of the State Agricultural Society, proposed a plan to its officers, which was accepted. The display this year, although not large, was regarded as very satisfactory. Plans have already been entered upon to secure a large competition and display for the coming year. An exhibit of the most valuable appliances in use in Great Britain will be secured. As a means of informing the people of the State as to what is desirable in this line, this exhibit cannot but come to be highly appreciated. The officers of the State Fair have kindly provided premiums, and have shown a zeal in oversight and co-operation for which they deserve the thanks of our citizens. It is the intention of the Board to collect also a museum of sanitary appliances, for permanent retention at the State House, so that our citizens may have access to the best models in sanitary inventions. Donations have already been

made, a room provided, a valuable library is also being gradually collected by the Board, which will be accessible to citizens of the State, and add to sanitary information.

EPIDEMICS.

The year has not been marked by any increase of epidemic influences in New Jersey. Our country has again been visited by the epidemic which last year so stirred our sympathy and affected our national interests. There are few evils without some suggested or associated good. Much of our progress in sanitary administration has resulted from the distressing and expensive experience of some invading scourge. It has been said that no great outbreak of disease has been allowed to pass away without giving a new impulse to sanitary measures. This has been realized in our own country in the formation of a National Board of Health, and in active local measures in various States for facilitating the control of disease and dealing with the causes which deteriorate the public health. It is a fact well known to sanitarians that yellow fever this year was held in check and confined to localities only by the most rigid isolating methods. The feasibility of such antecedent, timely activity, has been fully vindicated. New evidence is afforded in favor of this ever-vigilant care which can prevent or limit so many of human ailments. The country does not yet know how much it owes to the co-operation of the National and of Health Boards in limiting this great plague, as well as in devising methods which are silently and effectively being put in operation for the closer scrutiny of preventible diseases. Our own State records but a single case of yellow fever for the year, and that in the person of a non-resident. The State Board of Health took early precaution to provide for any case of exposure which might arise. Through the ready co-operation of your Excellency, our cities were apprised of the disposal that could be made of any reported case, if no local provision had been arranged.

The Quarantine authorities of New York consented to the transfer by their own Hospital boat of any case found within our territorial limits, at a cost merely covering actual expense. Our thanks are due to the Commissioners and to the Physician of Quarantine for the facilities afforded, and for their prompt transfer in the case which occurred. Due precautions were also

taken at Perth Amboy, and other points where yellow fever once prevailed.

It had been the intention of the Board to continue its report upon the diseases of animals. The Legislature however at its last session made temporary special provision as to diseases of cattle. There should be some permanent State oversight as to the diseases of all animals, rendered all the more important by the "fictitious facts" which so innocently and easily accrue from the present low state of veterinary science and art in our State. As it is still made the duty of this Board to have oversight of the great interest, we shall hope to aid in the prevention and limitation of the diseases of all animals by a close system of analysis and inquiry.

SANITARY NEEDS OF LOCALITIES.

During the year our advice has been sought in several places as to local sanitary measures and the best methods of procedure. In some of our cities the civil authorities have been making careful inquiries into actual conditions as preliminary to future advisement and wise administration.

The great embarrassment to effectual work has been an absence of such accurate vital statistics as shows the comparative death rate, and where continuous exceptional degrees of sickness from year to year indicate insanitary conditions. There is besides often a want of recognized and efficient agents to carry out any systematic work of sanitary reform, as well as absence of a precise intelligence as to methods.

In order to any effective movement or administration, there must first be a conviction on the part of the leaders of public sentiment of the actual existing insanitary state, of the possibility or feasibility of its correction, and a confidence in the agency through which it is to be effected.

In parts of cities the insanitary condition is demonstrated by observation, but the facts in detail can only be shown by accurate house to house inspections as well as street examination.

Dr. Farr, of the Registrar General's Office, of England, recently showed from the record of five hundred and ninety-three registration districts of England and Wales, extending through a period of ten years, that the yearly mortality of rural

districts, with one hundred and sixty-six persons to the square mile, was seventeen per thousand, while with a population of sixty-five thousand eight hundred and twenty-three to the square mile, the yearly mortality was not less than thirty-nine per thousand. A similar comparison for five years, by Dr. Russell, of Glasgow, as to Scotland, shows similar results. Still further he compares different parts of the same city of Glasgow, which shows a death rate of nineteen per thousand in the healthiest district, with a density of thirty-five per acre, with a death rate of forty-five per thousand in another district, with a density of five hundred and twelve per acre. It is also shown by the former death rate of nineteen per thousand how it is possible, with a reasonable degree of density of population, to bring down the average of a well-kept part of a city, since "the contrast is greater between the healthy and the unhealthy parts of Glasgow than between Glasgow as a whole and the open country; or, to put it in another way, you have even within the municipality of this city twenty-three thousand people, whose mean annual death rate for five years was only two above that of the rural population; yet a few hundred yards from these very people you find eighty thousand whose mean annual death rate, during the period of these same years, ranged from thirty-five to forty-five per thousand. Now, whatever may underlie this fact, it proves this, that it is not the situation, the soil, the climate, or any other physical circumstance common to the whole area, which produces this high death rate. In short, whatever the cause or causes may be, * * * they are not necessary, and therefore our condition is not absolutely hopeless, but eminently hopeful." This is equally true of contrasts which we will yet cause to appear between city and country, and even between different parts of this State, where there are other modifying conditions beside density of population. It is of great importance that while we are comparing country and city, and our cities with each other, that the local authorities should be comparing each part of their own municipalities by wards and districts, so as to learn the relative death and sickness rate, and be able to locate and deal with the non-essential breeding places of disease. With these and other equally significant facts, the people will come to to inquire for methods of prevention. As to these science, art and experience are so demonstrative, and such tabulated and

authenticated improvement of health have been secured as to make indisputable the feasibility of the undertaking.

The corrections to be made are only to a limited degree within the sphere of individuals. Officials whose intelligence and integrity can be trusted, and laws and ordinances giving adequate authority and jurisdiction are the most pressing demand. The matter belongs to the State and to the local governments, because it concerns the citizens in their most intimate relations. As such it must be reached by authority. If only we first find out what ought to be done and how to do it, there is no department of conferred power which is so likely to be administered faithfully and to be eventually recognized as economic and valuable.

The burden of unchecked disease and prevalent avoidable sickness on the one hand, and on the other hand the "dabs" of sanitation by which jobbery has been permitted to take the place of well-conceived, well-executed economical improvements, are alike to be avoided. But lessons as how not to do a thing, are never to lead to the inference that a thing ought not to be done. Gathering wisdom from the past we are now prepared considerately to proceed to plan both for the present and the future, and to execute with all the clearness and economy of method which the vital and financial interests of the citizens alike require.

We refer to the report of Vital Statistics for evidence as to the need in which many localities stand of better sanitary administration. We have been waited upon by citizens of Jersey City, Hoboken, Newark and New Brunswick as to the need of more active administration and greater attribution of sanitary power. We have evidence that other cities are suffering from the want of clearly defined powers and systematic cleansing. Complaints also come from country districts that there are no laws adequate to the removal of admitted nuisances.

In a few cases, nuisances have been brought to our attention, which by advisement we have been able to assist in limiting or abating.

An appeal from citizens of Millstone, as to the wastes of a distillery, was responded to by the Board. The nuisance was found to be of an extended character. When we came to confer with the proprietors we found them regretting the complicating circumstances which had caused it, and ready to co-operate with

us in methods of relief. The evil, however, illustrated the necessity of some general enactment to reach such cases, as we cannot always be sure of the success of argument and presented facts. Odors injurious to health, generally become most intolerable and dangerous during the heat of summer, when grand juries and courts are not in session, and when, therefore, the evil does not admit of abatement by indictment and civil process. Such evils are wisely placed under the summary jurisdiction of Health Boards whose knowledge and judgment are the guarantee that large powers will not be abused, but will be strictly used in necessary defence of the public health.

SEA-SIDE RESORTS.

The Board still has occasion to express some anxiety as to the sanitary provision and preparation, in respect to the new and increasing cities along our sea-coast line. In the present advance of sanitary knowledge these new and crowded settlements have no excuse for merely tentative measures, while the work which should be done is so much easier than when the land will have been covered with buildings. Even the summer tent, with its crowded occupancy and its possible untidiness, and the continuous camp meetings of various kinds, need sanitary discipline. The water supply must be excellent and the refuse of life must be disposed of by exact art. In a sandy soil too much reliance is generally placed upon the ready disappearance of water from the surface and the assumed natural purity of the wells. But it is to be remembered that there is an absence of ready vegetation to consume the decaying materials, and that sand is not nearly so good a percolator as it seems to be. Sandy spots like Savannah often mislead in this regard. Some time since the deaths in Northampton, England, ranged at forty-one in one thousand.

Dr. Hunter, the Health Officer, in accounting for it, says: "In this spongy sandstone, cess-pools once made are made and closed; they are hardly ever cleaned out and are always nearly empty. The meaning of this is that the ordure infiltrates all around, far and near, and their gases exhale from the surface." The dependence is upon well-water. "None of the cess-pools were cemented, and indeed it is a principle with the Northampton builders that the cess-pool needs no drain so absorbent is the

andy stratum. This is a fatal convenience, which may to some xtent account for the great development of fever in the sandtone counties."

Even wells sunk to an unusual depth in such a soil are found o become contaminated by surface juices. We notice with inerest that bored and artesian wells are being sought for water upply in many districts. Yet there is need to consider that geological structure and surface conditions modify the sanitary significance of the number of feet.

As the sea-shore is a resort for invalids, persons or families often go thither when being attacked, or when just convalescent from communicable diseases. Especial precautions need to be used lest there are local conditions which may give extension to such infections. This subject has attracted large attention at English watering places by the occasional outbreaks of disease which have occurred. Large hotels unoccupied in winter may all the more easily become the resorts for summer disease. It is not enough that honest owners inspect and assure of their perfection. Sanitary inspection is expert work, and the services of a sanitary engineer is often needed.

SMOKE AND STENCH NUISANCES.

Complaint continues to be made of the emission of smoke from factories laden with organic material and other sources of impurity connected with glue, bone-boiling, pouderette, rendering and other factories. A perfect furnace should send out only invisible carbonic dioxide, a little acid and vapor, and a few salts of ammonia. "Smoke is the result of distillation with partial combustion of the product." In a usual furnace we have a process partly of combustion and partly of distillation, while in contaminated smoke we have not merely noxious gases, but unconsumed fœtid organic particles scattered through the air. To all this is added the gases and particles of decay which are emitted from the material on hand, and from the saturation of the buildings and all that appertains thereto. All such tainted air is not fit for breathing, while there are abundant facts which show that like all other filth it affords a ready fertilization to filth diseases. That all are not affected, or that some become acclimatized proves no more than is proven when some withstand cholera or yellow fever.

Our attention needs to be directed to such nuisances, because to Bayonne and Elizabethport, and to the district as far as Newark, at Camden and other points, such factories resort, being driven out of larger cities on account of their unhealthfulness and the discomfort they cause. We need not refuse such industries, but we must bring them into conformity to laws which will prevent this injury to health, and a nuisance to all lines of public travel, as well as to the residents in the vicinity. Ballard and other authorities have shown how fully most of the evils of offensive trades can be obviated, how the smoke and odor nuisance can be abated, if only the owners will incur the additional expense of new and effective machinery for smoke consumption, and for the absorption of organic matter, and put them in the charge of competent stokers. Our authorities must insist upon the abatement of these evils which are already hazardous to health, and so disturb the senses as to convert discomfort into positive nuisance and jeopardy of health. English law no longer exacts proof that foul smoke or organic particles, or the gases of decay in a given case destroy life, but rather accepts the general fact of their deletrious nature. Besides both in a sanitary and civic view the public have a right to be protected from such evils as by common consent are regarded as nuisances, when they are the results of systematic methods, and abridge the comfort of the people in their homes or on the thoroughfares. Common law arises out of common rights, and should fully meet such cases as these.

SANITARY SURVEY—INSPECTION.

It was early the sentiment of this Board that it is desirable to select some city or thickly settled and exposed portion of the State for a precise method of sanitary survey and examination, so that we could furnish an example of thorough sanitary inquiry, and at the same time secure facts and statements with the precision which is characteristic of exact sanitary research into the causes and prevalence of disease.

Our attention was early directed to Hudson county, which by reason of its locality, its exposure, its recorded death rate and its massed population, evidently stood in need of special sanitary inquiry. It has a County Health Board which would gladly do

more if it had requisite financial appropriations, and City Boards recognizing the need but crippled in resources. It thus became necessary for us to seek out feasible methods for conducting the investigation which is recognized by all local health authorities as desirable.

Availing ourselves of a local committee, which, under the auspices of the New Jersey Sanitary Association, but without funds, had been making some inquiry as to the soil, drainage and sewerage of certain sections of Jersey City and Hoboken, and in their relations to the death rate, this Board, by an appropriation of fifty dollars, so aided and supplemented this work, as to secure maps that will be important for permanent sanitary reference. But it was apparent, that it is impossible for any voluntary committees to do the work needing to be done in such a large and populous locality. The insanitary condition of this section, not only affects its inhabitants, but by its intimate relations to New York Bay and Harbor, and to the inter-state travel as represented in the termini of great trunk railroad lines, involves the interests of commerce and internal traffic, and affects the nation at large. We therefore felt authorized, under the act of Congress creating a National Board, to ask a small appropriation to enable us to carry on a work for which no sufficient State or local aid could readily be secured. The National Board responded to our application, and under the superintendence of the New Jersey State Board of Health, a sanitary survey and inspection of the shore line and adjoining districts is being carried on. The services of skilled engineers have been secured, on terms that make them participators in the beneficence of the undertaking. The survey and investigation command the interests of the County Board, the local City Boards of the voluntary sanitary associations of the county, and of private citizens.

Already, the persons appointed to the work have made commendable progress. By another year we hope to be able to present such an outline of facts and such a method of inquiry as will commend itself as a model. Just such survey and inspection is needed in several of our cities as preliminary to sanitary administration that must be provided in the near future. Each city needs an underground and contour map which shall show soil, drain, sewers, connections, excavations, etc., as also the in-

equalities, grades, constructions and embarrasments of the surface and thus a close knowledge of all "building and house" conditions, such as shall enable them in the future to have ascertained facts in possession as the foundation of judgment, and of plans of execution, when public opinion, or the governing authorities, shall vote the evils too threatening or too burdensome to be longer endured.

It is just such work as this, connected with a careful return of vital statistics, that has been of such admitted usefulness in England, the evidence being diminished sickness, diminished death rates, greater prosperity and acknowledged recognition by the people of the benefits accruing. The Registrar General's Reports have for many years past given quarterly and annual statements of death rates in various parts of the Kingdom, with comparisons of localities as to insanitary conditions, and tables showing the results of sanitary works through a series of years, at numbers of places, sufficient to eliminate sources of error which might arise from temporary increase or decrease, or from limited areas. While density of population tends to increase the death rate, it has often been shown that there are compensatory methods of reduction, so that the death rate of most towns may be kept much lower than it really is. In illustration we quote from some of the quarterly and annual reports of General Graham, Dr. Farr and Dr. Russell. If the mortality of towns had been at the same rate as the mortality in the other districts, the deaths (for the quarter) would have been upwards of seventeen thousand fewer than they were. What was the cause of the great destruction of life? Evidently the violation of the plain, natural laws of life. * * * The intelligent classes of this country will, however, never acquiesce in the continuance of its present imperfect sanitary condition, and the resulting diseases which it brings down upon the heads of the population."

"The mortality of the districts in which the sanitary conditions are the least unfavorable, can be employed as the standard measure until happier times supply the real standard of vitality. Sixty-four districts in various parts of the country are found where the mortality of the people ranged, on an average extending over ten years, from fifteen to seventeen deaths in one thousand living. This is not accidental. The mortality only fluctuates in such places slightly from year to year, and the

death rate under the same circumstances will not be exceeded. * * * Here we stand upon the actual. Any deaths in a country exceeding seventeen in one thousand annually, are unnatural deaths. If the people were shot, drowned, burned, poisoned by strychnine, their deaths would not be more *unnatural* than the deaths wrought clandestinely by disease in excess of the quota of natural death. But it may be said that this standard cannot fairly be applied to determine the excessive mortality of large towns, which can never become so healthy as the country. How healthy towns may become we do not know. It is only proved that the population of parts of many towns experience a mortality little above the natural standard, and that the prevalent diseases are referable to causes which evidently from their nature admit of removal." Graham states the number of deaths in the United Kingdom at about six hundred and sixteen thousand, and the number constantly sick is about twice the number of annual deaths, or one million two hundred thousand and thirty-two. "One hundred and forty thousand of them die every year unnatural deaths, and two hundred and eighty thousand are *constantly* suffering from actual diseases which do not prevail in healthy places." Most of our American cities and no small portions of well-populated country in the United States and in our State, show a higher death rate than that upon which this statement is founded. (See Fig. 69.)

We hope it will yet be said of the cities of New Jersey as Graham said of London: "The improvement has proceeded step by step with the amendment of the dietary, the drainage of the soil on which the houses stand, the purification of the water which the people drink; with the sweetening of the air, and with the progress of medical science, which is the source of sound sanitary doctrines, and all further progress is in the hands of the people. They can work out their own salvation with God's blessing. The causes of disease are numerous; but every one that has hitherto been discovered can be to a certain extent controlled." Dr. Russell in his admirable lectures of this year on the "Prevention and Control of Infectious Diseases," gives many similar facts and illustrations.

In 1869 Registrar Graham says: "The large amount of preventible mortality has frequently been alluded to in these reports, but the statement sometimes has all the freshness of novelty.

As an illustration of this waste of life, it may be repeated with advantage, that during the ten years between the last two censuses, thirty large towns, having a mean aggregate population of two and one-half millions, lost *every year* 32,735 persons more than would have died had they been subject only to the rate of mortality prevailing in the healthy districts.

The English Reports, through a series of now just forty years, teem with facts, with statistics which give them the test of accuracy; with contrasts between country and city, and between cities that have adopted or neglected the most approved sanitary measures that are as demonstrative as inductive reasoning can be, that the health and life of the population is to no small degree a determinable quantity. Upon it turns the welfare and progress of localities, and of the State not less than that of individuals. The statistics of American States, so far as reliable, show similar facts. It is through the light derived from these and from recognized causes of insalubrity and from corresponding efforts at removal of causes, that we are to hope for that appreciation of public health, which will diminish one of the greatest burdens of society, and so add to the happiness and prosperity of the citizens. Our healthiest country districts show an average lower than that of England, while some of our cities outvie them in prolific sources of disease.

MIASMATIC DISEASES.

Reports that reach us from various localities, and which are fully confirmed by the medical transactions of various societies, make it evident that the miasm which causes chills and fever, intermittent and remittent fevers, dysentery and certain forms of neuralgic affection, is prevalent in many portions of the State. While the word "malaria" is often loosely used and made the name for some unclassified ailments in which the identification is not accurate, it can not but be recognized that a sickness excited by causes without the human body and having periodicity as a prominent diagnostic symptom, is wide-spread in its prevalence, and is a severe tax upon the industry, labor and health of our people.

While some points as to this "influence" are obscure, there are some ascertained and guiding facts which have obtained the

consent of practitioners of medicine and studious
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ɔugh the atmosphere, by means of the inbreathed air.
ir becomes supplied with this particular miasm chiefly
ılt of conditions which interrupt or complicate the natu-
esses of vegetable decay and provide no means by which
lucts of such "metamorphosis" or disintegration can be
enough appropriated by plants or in some other safe way
l of or kept dormant.
eat and moisture are essential to these decomposing
by which the super-abundant and unappropriated
matter, in the absence of natural or proper artificial
s, becomes a source of disease, it is especially during or
er continued heat, or during moisture and heat, that this
ar miasm is produced. This fact is not disproven by
er fact that periodical fevers often occur soon after a
drought. By it organic matter deep down and long
with its own sufficient moisture is reached by the heat
stirred into activity. Or a heavy rain after long heat and
, especially if followed by close or moist warmth, is apt
e rapid fermentive action in it and in other unused
on.
miasm is not carried, as a rule, to very great distances
ıe locality of such decay, and therefore the origin is
ly to be sought in the region in which the effect is
t. It is true that we can not control certain conditions
ɔsphere, of moisture or temperature, which especially
ıe production of the miasm or its characteristic effects
viduals at particular seasons. But by controlling any
nore of the co-operating conditions which produce it, and
re essential to its manufacture, we prevent its production.
chiefly to be accomplished by effective drainage, and by
rruption or compensatory interference with these forced
umulated conditions of decay with which the occurrence
dic fevers is associated. The value of this does not de-
on the assertion that the origin is purely vegetable, for
f organic matter in any form whether in the mineral,
or vegetable outside of man can only be properly provided

for where there is no stagnant water. The following recent utterance of Russell illustrates it:

"It has been conclusively proved by experiment that the cleans ng power of soil depends on its porosity rather than its chemical composition; in other words, upon the proportion of air it contains. Hence a wet soil possesses but feeble oxidizing power, and the first steps towards the restoration of this power is to remove the water by drainage and allow it to be replaced with atmospheric air. The best illustration of the relative activity of air, earth and water, as decomposing agents, as well as of the conditions most favorable to the speedy completion of the process by each of those agents, is afforded by their action upon dead bodies. The organism to be destroyed is visible, but these microscopic particles of organized matter which constitute the most dangerous portions of our excreta are destroyed in those media under exactly the same laws. A carcass laid in the open air upon a hill-side is swept by the free air, whose activities are also stimulated by the sun's rays, and the tissues which clothe the skeleton soon disappear. If laid in a shallow, running stream, or moored near the surface of a deep river, the same result follows; and if buried in a porous, dry soil, after a time nothing but the bones and the denser parts, such as hairs, nails, or claws, &c., can be discovered. Under all these conditions there is more or less rapid renewal of the active agent. But if we enclose the carcass in a bog, or plunge it in stagnant water, or bury it in soil which is saturated with water, instead of a clean and harmless skeleton, we get a repulsive mass of putridity and offensive complex organic gases which impregnate air, water and soil."

Both Price and Milne, in the commercial interests of life insurance, long ago demonstrated the high mortality of towns and of marsh lands.

Many of the English Reports exhibit the insalubrity of undrained lands by comparing several country districts of similar area and habitation, but differing in this one regard.

Eight districts thus compared showed a mortality of 2.45 as against 1.80 and 1.40 in the drier districts. This is the more significant, as this class of disease entails an amount of ill-health and repeated suspension from labor quite in excess of the usual rating afforded by the percentage of mortality. In 1859, speak-

ing of another district, the report says: Wisbeach, once so unhealthy, lost only one hundred and thirty-seven persons by death against three hundred and sixty-seven in Northampton, out of a population exceeding it, being thirty-six thousand one hundred and twenty-five. The successful result of the drainage of the district will, it may be hoped, lead the proprietors of the low, ill-drained parts of the basin of the Thames and of our other rivers to imitate the spirited conduct of the proprietors of the valley." "Such facts justify the remark that ague and rheumatism are not now frequently fatal in this country, but they occasion an incalculable amount of suffering, disability and secondary disease, which will disappear when the soil is effectively drained."

Ely, in one of the old Fen Islands, was so wet that its Bishop, without a river, went in his boat now and then to Cambridge. In 1851 it started its noted sanitary plans. In 1876 we have this record:

"The great land drainage works have had great influence in improving the health of the Isle of Ely. By this means the atmosphere has been purified and dried, and the returns for Wisbeach, in a comparison of twenty years, shows a marked diminution of consumption in the last ten years. Similar facts are recorded as to Orsett and Salisbury and Sheppy. (XIX 1874.)

The relief which time and again has come to armies and to persons by change of locality, shows the localized character of the malarial miasm. Again the oft-recorded results secured by efficient drainage and regulations as to the disposal of vegetable accumulations, have fully shown that it is in the power of every such State as ours to remove or largely diminish this source of ill-health.

Such diminution is feasible not only as adding to health, and so to the productive capital of individuals, but also as permanently adding to the value of land, and so promoting the interests of agriculture and of all arts identified therewith.

So far as drainage is concerned, no State of the Union has a more satisfactory basis for procedure. The geological structure is well defined, the natural water courses or the indications and methods for artificial ones are determined. There is only need of an apprehension of the necessity and a promotion of the work by such schemes as have already been approved by our Legisla-

ture, and as only call for the co-operative action of a majority of the citizens of any particular locality.

The time is well nigh past when any particular district can conceal the prevalence of so well-known an enemy. A study of the vital statistics of the present year furnishes some facts in evidence. It is the part of such communities or districts first to inform themselves of the actual number of cases that have occurred in their particular districts, to note the special lines of exposure, and then to adopt such measures as are sure to abate the nuisance.

It may often occur that by reason of prevailing winds one side of a sluggish stream or of a marsh furnishes more cases than the opposite one, or that one house is shielded by trees while in another the exposure is increased by the direction given to currents or by the moisture they add to a soil already saturated. But in general, so soon as a close study of a locality is resolved upon, there are not wanting facts and evidence which serve to satisfy the majority of those who are seeking for the truth.

In a former report we have adverted to what has already been done at the Great Meadows, by which over five thousand acres of land in Warren county have been successfully drained. There is a tract of eleven thousand acres on the Passaic river in need of just such relief. The State Geologist has well said, "It is greatly to be desired that this drainage should be done. It would bring a large area of excellent land into profitable use, and thus increase the wealth of the State. It would be a public benefit in removing a fruitful source of disease."

Not less do our people suffer in health from smaller swamp areas. Large swamp tracts serve to keep off population, and so many are not subjected to them. Besides, when wholly uninvaded, they are not sources of miasm to the degree that are the smaller areas which are pressed upon by civilization. Nature in these larger swamps, has yet some of her natural water courses, and the laws of vegetable decay, so efficient when left alone, are not so largely disturbed as near populous places. It is when towns and villages and cities crowd upon, or are in close proximity to undrained lands; when natural water courses are obstructed and usual vegetable decay interrupted or greatly supplemented by artificial conditions, when factories, and roads, and embankments, and excavations disturb competent natural condi-

tions and substitute artificial ones; when soil and locality, which would naturally rid itself of undue moisture, is covered with buildings and strewn with products of decay without growth, to utilize these, that imperfect drainage, suspended evaporation and unappropriated decay together enforce the penalties which always attend such flagrant breaches of law. On the lines where town and country meet, where art intercepts nature and breaks her laws, what wonder that there should be shaking, and that both city and country send up into the inbreathed air vapors prejudicial to health? What wonder that with such products of animals as are added in crowded places, and with all the offal of house and city life, we have diseases so mongrel as scarcely to define their type? Malaria has typhoid appended to it, and a whole group of diseases spring into existence, for which the highest authority of the age can find no name so appropriate as that of "filth diseases." Until in city and in country we learn that there is economy, health and necessity in avoiding stagnant water, befouled air and stagnant filth, or in providing for their abatement wherever they exist amid the homes of human kind, we shall have to pay to invalidity, disease and death, and to all the crippled forces of life, a folly and poll tax for city, county and State, heavier than war or politics can levy.

Problems, which arise out of civilization and its crowded or artistic accompaniments, must be met by adequate counter-provisions or else race-disease, race-degeneracy and death are the penalties.

These considerations are of importance, not only because of the medical testimony of previous years, as to the prevalence of periodic fevers, but the evidence gathered from our own correspondence and from the transactions of medical societies is still more decisive this year.

No one class of diseases has been so prevalent the past year as that in which the element of periodicity as generally characterized by the terms "miasmatic" or "malarial" has been either the causal or the largely complicating factor. Nor can this be alleged to be a general atmospheric condition, as when an influenza or an epizootic passes over the land. The increase is, in many instances, traceable to changed local conditions arising from disturbance of soil, additional sources of decay, stoppage of natural water courses, or other changes incident to new occupa-

tion of land and increase of population. Where these have occurred alike at different localities, and some are affected and some not, it is often because the character of soil and geological structures beneath determine how far nature is capable of ridding itself of these unfriendly conditions.

As an illustration of this miasmatic tendency, we may quote from the reports of District Medical Societies, as contained in the last "Transactions of the New Jersey State Medical Society."

In Bergen county it is said "Malarial fevers have prevailed as extensively as heretofore, and with a decided remittent form, with hepatic, intestinal and splenic complications."

The Essex county report begins by saying: "For the past year, as for several years, malarial diseases have made an important element in practice."

In Hudson county the record is that intermittent and remittent fevers were prevalent a part of the year. The Mercer county report says: "In Trenton we have a large increase in malarial fevers. Intermittent neuralgia has been quite prevalent; indeed all diseases to a more or less extent have shown a tendency to periodicity." In Morris county there was "a marked increase in the number and severity of malarial disorders." In Passaic county "intermittent and remittent fevers have been more than ordinarily prevalent during the year." The same record is made as to parts of Somerset county. In Sussex county "intermittent and remittent fevers, and neuralgia of malarial origin seemed to have prevailed to an unusual extent in every locality heard from." Intermittent and remittent neuralgia are reported from parts of Union county. Warren county, at Washington, Oxford, etc., notices the great prevalence of periodic fevers. Although this report relates in part to the summer and fall of 1878, our own inquiries in 1879 show the same tendencies and occurrences continued. In Middlesex county there has been an increase, and reports from special localities in other counties show no diminution. The counties in the northern and western portions of the State seem to have suffered most, although the banks of the Delaware are never exempt. Towns and cities suffer much, while in the large and more rapidly growing of these there are mixed symptoms in disease which, by their mongrel character, show the trace of a distinct periodic type, and yet so commingled as almost to

constitute new forms of infection. This is especially noticeable where city and country meet, and marsh lands press closely upon the suburbs. It is not the abstract question whether a luxuriant marsh will care for itself, or whether the salt in an undisturbed salt-grass meadow will aid in guarding decomposition, but rather whether, after interrupting natural drainage and natural vegetation, we can send out from a city its own decaying vegetation and animal compost and sewage and make of the whole, broth and gases conducive to health. We must guard the border land or else it will be a point of attack and not a defense. This entire subject of drainage and water-delivery in the interests of public health demands far more attention from our citizens than it has yet received.

The only other disease which has prevailed in our State since the last report, and yet does not make its record by name in the classification of vital statistics, is influenza. Several counties and cities of the State report it to have occurred in an epidemic or epizootic form. Its effects are only severe on older persons, with whom by reason of bronchial affections it sometimes proves fatal. It is quite probable that under the more general name of bronchitis it has added to the large list of acute lung diseases. A careful review of the report on vital statistics shows, as never before, the actual causes of death, and enables us to compare localities in every township and city of the State.

As a part of the report of this Board to your Excellency, the several papers herewith submitted will, we believe, be found of interest to yourself, to the honorable members of the Legislature, and of profit to all citizens of the State. In the securement of these very great care of selection is exercised, and in general the principles and methods advocated are such as command our approval.

THE PAPER ON HOUSE DRAINAGE AND SEWERAGE

Is designed to draw attention to the best methods of connection with mains, so that the house itself, with its inmates, shall be secured against the intrusion of deadly gases. The experience of a practical sanitary engineer, as also of a practical plumber, is given, and such directions as must greatly aid in the comprehension and application of methods. A clear statement of the

objects sought and of methods proposed will enable all to adopt these views or suggest any others which can stand the test of actual observation and experience.

THE PAPER ON ASPHYXIA, WITH SPECIAL REFERENCE TO THE RESUSCITATION OF DROWNED PERSONS

Has been carefully prepared, after close investigation and experiments on the part of the author and with the aid of all the literature on the subject. The same principles of management apply in most cases of asphyxia, while our long line of seashore and our river communications point to dangers and accidents not infrequent. Our estimate of the importance of the subject is much increased since we find, by our vital statistic returns, that from July 1, 1878, to July 1, 1879, one hundred and ninety-three (193) persons in this State perished by drowning. In the light of recent investigations and disputations as to methods, a review of the whole subject was needed. To it some members of the Board have directed careful attention. We think that this paper will be found worthy of careful study. There is need of more provision along our coast line, for the safety of bathers or of those capsized in small boats. We commend the subject to the attention of all those who seek recreation by water.

THE ADULTERATION OF FOODS

Is so weighty a public concern that there is need that it be carefully watched under the oversight of experts. Public analysts at moderate expense are greatly needed. While the paper offered seeks to counteract a recent tendency to overstate adulterations, it recognizes the importance of constant inquiry. It is likely that a more extended examination of specimens would reveal new facts, and it is the desire of the Board that the public health be thus guarded. There are many other articles of which examination should be had, while the author desires a more extended series of tests as to some of those already examined.

No new examinations of kerosene have been conducted, but our accident list records several cases of fatal burns therefrom. There is pressing need of some legislation which shall protect our people from unrefined oils or from mixtures containing more naphtha and other ingredients than petroleum oil.

DISINFECTION AND DISINFECTANTS.

It has been the aim in the paper on disinfection, to select the authenticated materials for use, to the exclusion of most of those unnecessarily protected by patents. The range here afforded is sufficient for all known indications, and directions are given so plainly as to be available to all. While these can not take the place of cleanliness they often greatly aid in securing it while disease exists. It can not be too much insisted upon that it is the duty of each householder to see to it that causes of foul air are removed, and that the air itself is so dealt with as to remove from it noxious ingredients. The circular is reprinted for ready reference.

METEOROLOGY.

The importance of the study of meteorology in its relations to disease is recognized. Yet there are many difficulties that embarrass us. This article commends it to the careful inquiry of physicians, and presents suggestions as to some special points. It is only by long and close observation and the tabulation of facts that progress can be made. The close observation of individuals is magnified as to be considered along side the records of instruments of precision.

GOVERNMENT OF FORCES.

The letter presented to the State Commission on the government of towns is reproduced because it presents some of those reasons which commend the subject to the towns themselves. There is a spirit of inquiry in this direction, and our cities may profitably study the problems which ere long will force a more public and official consideration.

UNDERTAKERS AS RELATED TO PUBLIC HEALTH.

The Board has had occasion for considerable correspondence with undertakers. Their work is regarded as so special that in some of our States a license is required. The more intelligent of this useful class of citizens have come to feel the importance of accurate death returns, and have responded to the requirements of the present law. In country districts some do not promptly enough return the certificates to assessors, and the Board is about to institute more rigid methods of inquiry. It is evident that the undertaker in his contact with families during the prevalence of sickness or after death is capable of aiding much by sanitary advice, and no class need to be more accurately informed. Also there are great errors that occur in the sanitary conduct of burials, which can only be corrected when our undertakers are intelligent as to the sanitary requisites of their calling. It is more than a mere art of adornment or act of burial. It should include all that knowledge which secures a due preservation of the dead for a limited time, and which best protects the living from the evils of foul air or the infection of contagious diseases. Often more depends upon the undertaker than upon all the other attendants or assistants combined. It is now possible to practice this calling as an art, and to do much to protect from the extension of disease. We direct their attention to this article and to that on disinfectants, as imparting knoweledge with which they need to be familiar, and for which they will find frequent use.

The meteorological notes for the year are not as perfect as we had hoped. By reason of the sickness of observers, there have been some interruptions.

Instruments are now placed at desirable points, and observers secured so that we shall hereafter, it is hoped, present the readings with accuracy. This is a department of observation in which we accomplish something by adding to the general stock of climatological information, but need to be slow in drawing or accepting conclusions.

As the domain of sanitary legislation and the powers to be conferred on Health Boards, need to be better understood, we are glad to secure a report upon this subject from an able mem-

ber of the New Jersey bar. We invite to it the careful attention of our law-makers, and of all who recognize the need of some enactments and decisions, to prevent the litigation and delays which now so often embarrass local authorities and permit nuisances to imperil the general health.

The report of the Medical Superintendent of Vital Statistics commences with July 1st, 1878, and extends to July 1st, 1879. It is the first attempt in this State to make a tabular study of the causes of disease. While some valuable facts are already indicated, yet it is chiefly by comparing five or more years, that we get at the precise death and sickness rates of localities. The report, with the tables accompanying, is commended to the careful study of physicians, and of all who recognize the significance of such facts as to the population. Although, by law, this report is made a part of the annual Health Reports, the service is a bureau of the State Department, and under the Secretary of State. To him the Medical Superintendent is greatly indebted for his official co-operation and for valuable suggestions, as well as to the Board of Health, which recognizes these studies as a virtual and essential basis to sanitary science, and its application in practice. The experiences of the past year fully certify the practicability of the general methods adopted, while such improvements will be made as practice and study may indicate.

HOUSE-DRAINAGE AND SEWERAGE.

BY EZRA A. OSBORN, C. E.

The introduction of water into houses and the system of drainage necessary to carry off waste, all of which comes under the head of plumbing, has become a matter of importance, inasmuch as great danger to life and health arises from gases generated in the sewers and cesspools, which we feel safe in saying, in a majority of cases, find their way into dwellings in consequence of the careless and unscientific manner in which this kind of work is done. This is, perhaps, not to be wondered at, when it is considered that in most cases this matter is entrusted to the mechanic who offers to do it for the least amount of money. The builder fails to appreciate the danger to which the occupant of the house, when finished, will be subjected, in consequence of the unskillful arrangements of pipes, traps, &c. Ignorance in a matter, the result of which is so frequently fatal to life, may justly be termed criminal. In order to arrive at a better appreciation of this important branch of mechanics, we desire to explain, in a simple manner, our views as to what is essential to safety in all cases where house drains are connected with sewers. First essential: "Every vertical soil or waste-pipe should be extended at least full size through the roof. No traps should be placed at the foot of vertical soil-pipes to impede circulation. Traps should be placed under all sinks, basins, baths, wash-trays, water-closets, &c., and as near to these fixtures as practicable. All traps under fixtures, whenever practicable, should be separately ventilated, in order to guard against syphonage. Such vent-pipes should not branch into a soil-pipe below where any drainage enters it. In some cases it is preferable to carry it to the outer air independently. Rain-water leaders should not be used as soil-pipes, and when connected with house drains they should be made of cast iron in preference to galvanized sheet iron or tin, there being less liability of corrosion. Joints should

be gas and water-tight, to preclude possibility of drain air ente ing open windows. No safe-waste should connect with ai drain, but it should be carried down independently to a poi where the discharge would indicate the existence of a leak or ai overflow above. No waste from a refrigerator should be co nected with a drain. Unless the water supply is ample, so th it will rise to every part of the building, insuring at all tim the proper flushing of fixtures and traps, a cistern should l provided, into which the water will rise at night, or into whi it may be pumped. Said cistern should be large enough to ho an ample daily supply, and be kept clean, covered and proper ventilated. The overflow-pipe from it should never be run in any drain under any circumstances. The supply for drinkir water should not be drawn from it, but from a direct supply, *i.* direct from the street main.

Water-closets should not be supplied direct from street pressu or by a pipe from which branches are taken for drinking wate Where the water-closets are preferred to those that are supplie from a small cistern immediately over them, then the supp should be taken to a storage-tank, from which it can be convey to the valves on the closets, thereby insuring an equable pressu and securing more reliability in their working.

All drain-pipes within a house should be of metal in prefe ence to stoneware, owing to the liability of the latter to crac and the difficulty of keeping the joints tight. It is best to ru them along the cellar wall or ceiling with a good incline. Th should never be hidden under ground, as there leaks will n be perceptible. In some places it is common to paint pip white, so that any leakage will show itself to the most carele observer. All drains should be kept at all times free fro deposit; and if this cannot be effected without flushing, speci flushing arrangements should be provided, so as to effectual remove all foul matter from the house-drains to the publ sewers. All drains should be laid in a straight line, with prop falls, and should be carefully jointed and made water-tight. N right-angled junction should be allowed.

A drain passing under a dwelling house should be construct of cast-iron pipes with lead caulked joints, laid so as to readily accessible for inspection. Whenever dampness of si exists it should be remedied by laying sub-soil drains, whi

should not pass directly to the sewer, but should have a suitable break or disconnection. Water supply and drain-pipes should be concentrated as much as possible, and not scattered about a building. Horizontal pipes are objectionable.

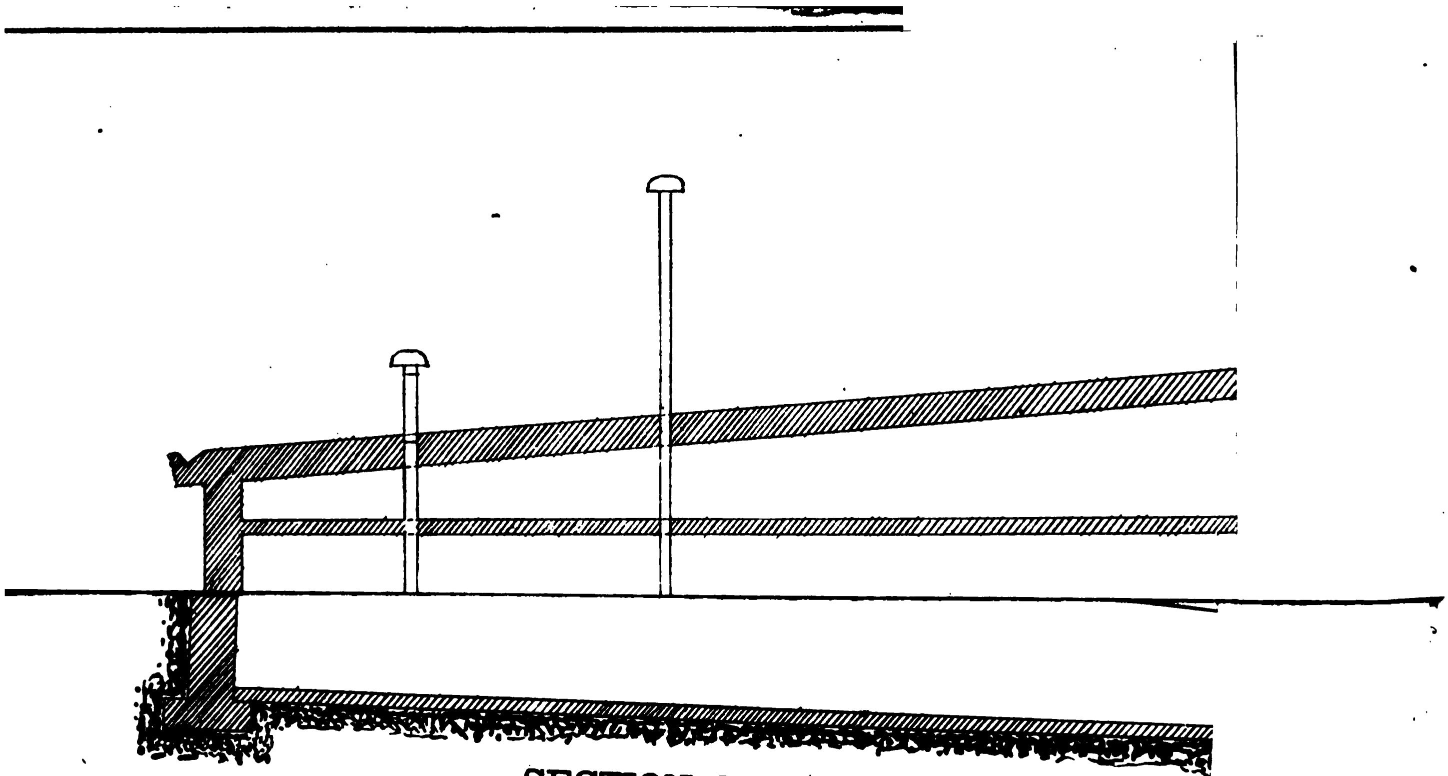
Plumbing fixtures should not be hidden behind walls and partitions where their condition is never apparent. They ought to be made easily accessible and so situated that any leak will be readily detected." In no case should lead waste-pipe be connected to iron pipe with cement or putty. Connection can be made by the use of a brass ferrule or thimble, one end of which should be caulked into the iron the other soldered to the lead, or a good and more economical plan is to turn the end of the waste-pipe over a ring of some metal and caulk into the iron pipe. Without claiming to have exhausted this subject we have endeavored, and hope we have succeeded in our endeavors, to make easily understood the fundamental principles which should be observed in the arrangement of soil, waste and ventilating pipes, in order to secure immunity from danger by reason of allowing the poisonous emanations from sewers to pass freely into dwellings. Next in importance we remark that care should be exercised in the selection of plumbing materials as regards quality, especially water-closets and traps. The former should be so constructed as to positively prevent the back-flow of foul air or sewer gas; and the traps of such kind and shape as will be least likely to be emptied by suction or syphonage. In fact all modern fixtures and appliances for the convenience and comfort of our homes should be thoroughly understood practically and scientifically, and so constructed that it shall be impossible for any evil to arise from sewer-drains, water-closets, basins, traps, &c. So many contrivances are based upon this one idea, it surely seems that all of them should answer the purpose of pure sanitation. Diseases caused by foul air that can be prevented, requires one very essential condition, *i. e.* cleanliness, and to become clean, all filthy matter must be cared for without offense. Now the question is, how can this be accomplished effectually and economically? The different inventors of sanitary appliances have as many modes as there are inventors. For the purpose of bringing such articles and appliances before the public, the New Jersey State Board of Health proposed to make a public exhibit of appliances for per-

fecting house drainage. Upon conferring with the New Jersey State Agricultural Society, (it being partly supported by the State), it was arranged to have an exhibition of sanitary appliances in full operation at the Annual Fair at Waverly. Inventors and dealers in sanitary appliances to some extent, responded to our circulars, and so made the exhibit a good beginning to an important yearly display. The Board of Health not having any funds to erect the proper buildings, water supply, &c., necessary to show water, sewer and plumbing arrangements, by solicitation of said Board, E. Dunn & Bro., practical plumbers and sanitary engineers of Newark, N. J., undertook, at considerable expense to themselves to provide for this part of the exhibit. With great diligence they prepared some specimen plumbing, as well as a complete system of house drainage, with drain and trap ventilation. It was put in full operation, in such a position that every part could be seen, the water being supplied to a tank by a Rider atmospheric pumping engine. The whole sanitary exhibit was very carefully and critically examined by a committee of ten experts, comprising professors, physicians, civil engineers, &c. For the purpose of assisting the public to comprehend how house-drainage should be done, we present the system and plans as thus shown:

[SEE DIAGRAM.]

The diagram of this exhibit is presented herewith, shows that a trap is placed outside of the house (which should be in a vault of easy access for the purpose of cleaning), and close to this trap, next to the house, a ventilating-pipe carried above the roof. The soil-pipe is carried full size through the roof.

In connection with each line of waste and soil-pipe there is a circulating air or main vent-pipe running independently to the roof, and above the soil-pipe, the main vent. A branch is connected from each trap on that line, thus maintaining an easy circulation, it being impossible to syphon the traps. To understand the practical working of currents of air through these pipes, the committee had them bored, which, by the application of a lighted match, fully demonstrated the direction and force of the air currents.



SECTION OF A HOUSE,
SHOWING
System of Sanitary Plumbing
AS EXHIBIT…

: is to be hoped that from year to year various plans of house inage, sewerage and ventilation will be thus exhibited.

'he exhibit was visited by a large number of persons in and of the State, who manifested a great interest, and were greatly ised to have the chance to investigate a system in practical ration. The matter of house drainage and ventilation is not nded to be confined to dwellings or houses we live in, but re-s to all places where people congregate or are employed, ether churches, work-shops, schools, stores, depots, cars, &c., &c. loes seem, that with the many plans of reducing foul air and pletely deodorizing all kinds of filth that any person of inary intelligence should live in a clean and decent manner hout any legal compulsion. In our suburban houses and intry places there does not seem to be any excuse for evil cts from house sewerage, privies, &c., where dry earth and es are always at hand. The writer when building his house 1852 arranged in a rude way for using marl, with a very little uble, for privy and other filth, thereby keeping down all the rs, &c. The plan works well at a nominal cost; in fact the npost made as a fertilizer more than pays for the trouble. t many say that while their neighbors have all kinds of aying matter about their premises there is little use of their ng much with the nuisance just along side. We have had ny such complaints, some of which have been published. It ms as if our State must take notice of such evils and by islation have the same abated, and our Legislature make h laws as will conduce to the public good by summary state-nt of filth nuisances. The sanitary care of premises is best l in a single suggestion of J. C. Bayles, author of "House inage and Water Service:" "The first essential condition of lthfulness is cleanliness. The shovel, the broom, soap and er, sunshine and ventilation are the agents upon which we st mainly rely in guarding against unhealthful conditions in surroundings. How, when and where the broom, shovel l scrubbing brush need to be employed the reader must ide for himself. I can only say in a general way that any-ng and everything which can be properly classed as "dirt" uld be put where it belongs. It will then cease to be dirt. ere are few things so dangerous that we cannot rob them of ir power for mischief by putting them in their proper places."

A very practical country physician was once asked by a neighbor, who was not over-particular as to the condition of his premises, what would be the best disinfectant to get for use before hot weather came on.

"I will give you a prescription if you will get it filled and use it," said the doctor.

This was agreed to, and the doctor wrote as follows:

℞	Rake	1
	Shovel	1
	Wheelbarrow	1

Sig.—Use vigorously every twenty-four hours, until relieved.

The hint was taken and the premises were cleared up. Air and sunshine did the rest.

ASPHYXIA.

VITH SPECIAL REFERENCE TO THE TREATMENT OF THE DROWNED.

BY T. G. CHATTLE, M. D., OF LONG BRANCH.

The economy of the animal system provides that the blood ust be ærated or, supplied with oxygen, by the absorption of ›mmon air into the lungs. To this end these organs are com›sed of a net-work of minute cells, or air vesicles, into which, anything else other than common air is introduced, it becomes foreign body, and as such, needs to be immediately rejected; so, if common air is merely excluded, they cease to perform eir natural functions.

The result of the æration of the blood, is the evolving of ternal heat, and that action of the vital fluid, upon which ›pends the healthy action of the brain, as well as the systematic ›ntraction of the ventricles of the heart, and the origination of ıat nervous fluid, or influence, through which the motions and ›nsations of life are derived. Whatever interferes with this ›rial supply, destroys the normal action of the whole vascular ystem that is dependent upon it, and life itself is soon extinuished.

The inspiration or breathing in of oxygenized air, and the xpiration or breathing out, of carbonized air is known as respiation, and is performed directly through the lungs, under the nechanical action of other organs. The most prominent of these s the diaphragm, which, being situated midway between the xtremes of the animal system, aided by the muscles of the hest and abdomen, conducts any expulsive effort that the ystem may be called upon to make. Its importance in the nechanism of breathing is such, that should it become inactive, ›r paralyzed, a speedy death would result to the individual from the vant of breathing power. This organ, whether active or inactive s very sensitive to the external influences, and is readily stimuated or quieted, by external force or injury. It also, in turn,

is under the control of the inter-respiratory, or phrenic nerve, whose branches are distributed over its whole under-surface. When the nerve-force ceases to be exerted, the diaphragm ceases to act, and the respiratory movements of the chest are quiet, but as soon as this is stimulated by mental influence, or mechanical causes, the expansion and contraction of the chest ensues, and respiration is performed.

The substances and organs thus concerned in sustaining life, are the lungs, as the receptacles for air and blood, the air supplying the elements of blood purification, the blood producing nerve-force, the phrenic nerve originating action in the diaphragm and its attendant muscles, and the diaphragm itself, which is the lever that raises or depresses the chest in its bellows-like movements during respiration. Whatever prevents the healthy action of the blood or the action of the diaphragm, causes a cessation of the forces sustaining life, whether it be physical injury, the breathing of poisonous gases, impeded respiration or the non-elimination of carbonic acid gas.

In the functions of the heart and lungs, there may be a real or apparent cessation, while the apparent by a prolongation, may become real. The apparent cessation is asphyxia; the real, is death. Asphyxia in its technical sense, signifies a want of pulsation, but in its common acceptation is used to indicate a condition of suspended animation, whenever this suspension occurs from a retarded respiration. There may be apparent suspension of the heart's action, without entire suspension of respiration, as in syncope, and there may be apparent suspension of respiration without entire suspension of the heart's action, as in apnœa, and there may be apparent suspension of both functions, as in catalepsy. But when a real suspension takes place in the functions of respiration, it must soon be followed by a similar suspension of the heart's action or vibrations, indicating death. The same forces that prevent the normal action of the respiratory nerves and muscles, as smothering, drowning, strangulation, carbonic acid, and other poisonous gases, are all causes of asphyxia, either mechanically or otherwise impeding the acts of respiration, and place the patient in a condition that without relief must end in death.

Where different organs are successively affected, in close connection with each other, by disease or accident, it is difficult to

give the exact order of the phenomena as they occur, but the experience and observations of those who have examined the matter closely, would seem to indicate the following as the order of the arrest of the vital functions in asphyxia. Any obstruction to the entrance of air into the lungs, renders the flow of blood slower in the whole vascular system. It gradually becomes filled with carbonic acid gas, which so thickens it, that it cannot circulate through the capillaries. The brain is only supplied then through the larger vessels, and being sluggish from the want of oxygen, it enfeebles the action of the cerebrum, destroying its influence over the nerves both of motion and sensation, which involves the cessation of the action of the phrenic nerve, and its attendant muscle the diaphragm. Capillary congestion ensues as the respiratory action is weakened, which demands increased labor on the part of the heart, while from the want of purification of the blood the labor becomes more and more difficult, until exhausted from the loss of nerve force, its contractions cease entirely and life becomes extinct.

It has been generally believed that the contractions of the heart ceased soon after the close of respiration, and authorities have been experimenting for years with a view of arriving at some definite knowledge concerning this matter. While the result of their investigations has brought them to different specific conclusions they have still indicated one general average. Experiments have been made on pups, rats, rabbits, cats and other animals, where they have been submerged, or placed in carbonic acid gas for various lengths of time, and have been examined at different periods after life had been apparently extinct, varying from two minutes to an hour, and various results have been found. In experimenting on twenty different animals, in two cats it was found after a complete submersion of one for ten minutes, and between five and six minutes after asphyxia had thoroughly taken place, in the other after a complete submersion of eight minutes, and an examination in four minutes after complete asphyxia, that the ventricles were in active contraction, with a convulsive tremor of the respiratory muscles, as if a slight respiration were taking place or endeavoring to re-establish itself. The shortest time in which all heart action was noticed to have ceased was in a pup, where in two minutes and ten seconds there was not a sign of life to be discovered. In the

remaining seventeen, the time varied from two and a half minutes to three and a half and four minutes, making the average duration of the contractile power of the heart about eight minutes after submersion, and about three minutes after complete asphyxia.

As it is sometimes the case that bodies are taken from the water after the lapse of a considerable time, and efforts are made at restoration, it becomes a matter of some importance to know how long a body may remain under water and be revived, or at what precise point the vital functions are so far destroyed as to make it impossible to call them again into active duty. Although the length of time during which action of the heart continues after asphyxia, has been well determined by experiment, as also the time that a body can be drowned and yet revived, has been well determined by observation, so that there would seem to be but little variation, yet circumstances do exert great control in cases of this character. Three minutes is the established rule, after which there can be no recovery, if it be real drowning, but persons have been recovered who have remained under the water in an asphyxiated condition for four and five minutes. The last is the longest possible time after which resuscitation could take place, unless the case be one of syncope or nervous shock, when persons have been revived even after fifteen minutes apparent death. Those capable of inhaling and retaining a large amount of air into the lungs, and those who retain their presence of mind in the greatest degree are those who resist the dangers of submersion for the longest time, and are the most readily revived, while those who force nearly all the air from their lungs at the first shock, can seldom be recovered.

As the vast majority of asphyxiated cases are those of drowning, and as the specific treatment is nearly the same in cases of whatever character, it is deemed only necessary to turn the attention to the care and treatment of the drowned especially.

DROWNING.

In drowning, the organs that are primarily affected are those of respiration, those secondarily affected are those of circulation, and the phenomena that present themselves during the act of drowning are as follows:

When a person falls into the water or is exhausted by the act of swimming, he goes beneath the water, then again comes to the surface, aided by the buoyancy of the air in the body and in the clothing. In coming to the surface, realizing danger, he instinctively assumes the upright position, springs from the surface, and throws up the arms for help, at the same time endeavoring to relieve the desire for breath, by an inspiration, and to express the desire for aid, by calling out. This effort takes in water as well as air, and produces a slight spasmodic cough during which act the body goes beneath the surface the second time. As the consciousness of sinking becomes more acute, there is an agonized expression of the countenance which is indescribable, but which, when once seen, will be ever remembered and recognized—and at the same time frantic efforts are made to grasp everything that can be seen, whether within reach or not, and this desire continues even after having sunk, as oftentimes bodies are found clutching the weeds, grass, or stones, that may be found at the bottom of the water.

Sometimes the air is so exhausted from the system, that the body does not come to the surface after going down the second time, but generally there is sufficient inflation to bring it once more to the surface, when as soon as the head comes above the water, the urgency to take breath has become so great that a full inspiration is made without due caution, and a large quantity of water, and a small quantity of air is taken into the system. The water penetrating into the bronchial tubes produces a second fit of coughing, expelling what little air may be left, and the body sinks just below the surface or goes to the bottom.

Along the sea coast casualties of this character generally occur to those who are expert swimmers—they becoming exhausted by too severe an effort in this direction.

However, it is not always the case that those who are said to be drowned are really so. Death in the water may arise from exhaustion, nervous shock, cerebral congestion, or apoplexy. In cases occurring from other causes than drowning the body seldom sinks immediately, but floats upon the surface, and it is desirable to know when a body is taken from the water, whether the condition is one of asphyxia from submersion, a condition of syncope, or a condition of death from some other cause. It is useless to endeavor to resuscitate a body dead from nervous

shock or apoplexy, while it would be criminal to allow one to perish that might have been resuscitated by proper means.

The face of a person drowned is of a dark livid color. The eyes protrude and the vessels of the neck stand out full and turgid. Froth or foam oozes from the mouth and nostrils, sometimes white, but generally rusty or streaked with blood. The tongue is swollen, and almost always marked by indentations from pressure against the teeth. Such are the prominent appearances within a few moments after drowning. The later appearances do not interest those whose desire it may be to restore the recently drowned.

For years it has been the study of scientists in physiology and hygiene to elaborate the most practical method of resuscitating drowned or asphyxiated persons, and to establish a code of rules best adapted for the purpose under all circumstances. Fortunately for the patients and for science, the old plan of suspending the patient by the feet and then rolling the body on a barrel, the object of which no one could divine, has become obsolete among well-read people, and more improved plans have been largely adopted.

The method, which has become the most prominent, because it was the first laid down in accordance with any fixed rule, is that generally known as "Hall's Ready Method," and was originated by Dr. Marshall Hall, of London, as follows:

1. Place the patient gently on the face for a moment to allow the escape of fluids from the mouth.

2. Turn the patient on his back and irritate the nostrils by snuff, a feather, ammonia, &c., and dash hot and cold water alternately upon him.

3. Place the patient on his face, with the wrist under the forehead, then turn the body gradually, but completely on the side and a little more, then back again on the face. When replaced on the face, apply pressure along the spine and ribs, then proceed as before, repeating these measures sixteen times in a minute only.

4. Rub all the limbs upwards, firmly but energetically.

5. Replace wet clothes by such other covering as can be procured.

A later method proposed by Dr. Sylvester, and a better one than the preceding, is as follows:

1. Clear the mouth and throat of dirt and saliva, and draw the tongue forward by the thumb and finger or by a pair of forceps.

2. Place the patient on his back with his shoulders slightly raised.

3. Let the operator kneel behind the head of the patient and grasp the arms just above the elbows, drawing them gently and steadily upwards until they meet above the head; then bring them down again to the sides of the chest, compressing it in a slight degree, so as to imitate expiration. This is to be done sixteen times in a minute.

That known as the "Howard Method," is as follows:

1. Turn the person on the face, with a bundle of clothes beneath the stomach, at the same time pressing on the spine to eject the fluids.

2. Then place the patient on the back, with the bundle of clothes underneath, to elevate the pit of the stomach.

3. Let the operator kneel astride or beside the body, near the hips, and with the ball of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves between the ribs, let the operator throw himself forward and squeeze the waist, then let suddenly go. At first make four or five movements of this character in a minute, and gradually increase up to fifteen.

The method recommended by the Life Saving Association, of Michigan, is embraced in the following:

1. Place the patient on his face.

2. Bestride the body, and grasp the clothing over the shoulders; or if the body be naked, thrust your fingers into the armpits, clasping the thumbs over the shoulders.

3. Raise the chest as high as you can without lifting the head from the ground, holding it until you can count one, two, three, very slowly.

4. Then let the body rest on the ground, the forehead on the flexed arm, the neck straight and nose free.

5. Then place the elbows inside your knees, and with the hands on the sides of the patient's chest, over the ribs, press downward and inward with increasing force long enough to count one, two. Suddenly let go the waist and clasp the shoul-

ders, as before, raising the chest. Repeat these movements ten or fifteen times a minute.

The directions laid down in the Regulations of the United States Life Saving Stations, are as follows:

1. To arouse the patient. Unless in danger of freezing, do not move the patient, but instantly expose the face to a current of air. Wipe dry the mouth and nostrils, rip the clothing so as to expose the chest and waist, then give two or three quick smarting slaps on the stomach and chest with the open hand.

2. To throw off the water. If the jaws are closed separate them and keep the mouth open by a cork or a bit of wood. Turn the patient on his face, having a large bundle of clothing tightly rolled, placed beneath his stomach. Then press heavily over it for a moment, or as long as the fluid keeps flowing from the mouth.

3. To produce breathing. Clear the mouth and throat of mucous by introducing the finger, covered with a handkerchief, into the throat; turn the patient on the back, the roll of clothing being placed under the back so as to raise the stomach above the level of the other parts of the body. If another person be present, let him hold the tip of the tongue out of the corner of the mouth, with a piece of dry cloth, while with the other hand, grasp forcibly both wrists, and keep the arms stretched back above the head, thereby increasing the prominence of the ribs, which tends to enlarge the chest. Kneel beside the patient's hips, and with the balls of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves of the short ribs so as to afford the best grasp of the waist. Using the knees as a pivot, throw all the weight forward on the hands and at the same time squeeze the waist between them as if you wished to force everything in the chest up out of the mouth. Deepen the pressure while slowly counting one, two, three, then suddenly let go with a final push, which brings you back to a kneeling position. Remain erect on the knees, while counting one, two, three, then repeat the same motion as before, gradually increased to fifteen times a minute, imitating the same regularity observable in the natural motions of breathing.

4. If natural breathing be not restored after a trial of the bellows movement for the space of four minutes, then without

errupting the artificial respiration, turn the patient on the mach a second time, and rolling the body in the opposite ection from that in which it was first turned for the purpose freeing the air passages of any remaining water, continue the ificial respiration as above.

5. Rub the limbs briskly, and upwardly, with a firm, grasping ssure and energy. Warmth should also be promoted by plying hot flannels.

Dr. Satterthwaite, in the first number of the medical journal, *blic Health*, lays down a plan of treatment that is far more entific and sensible than the majority of the plans that so en appear in medical periodicals. His plan is as follows:

1. Try and get something warm to exchange for wet clothing. nd at once for hot water or have a fire built, into which bits of tal or stones may be thrown and heated, and from which you y warm blankets and the bystander's clothes, which are to be plied in rapid succession.

2. Try and get rid of the water by slightly elevating the body ile the mouth is wedged open and the tongue depressed. To this effectively, roll the person on the face, raising the body, ver extremities and feet slightly, then wedge the mouth open h a bit of wood or knot in a handkerchief, then place the left efinger on the back of the tongue and depress it. The finger l not be bitten, because the mouth cannot close. This opens windpipe better than if the tongue is drawn out. Then getg beside or astride of the person, press with the flat of the d upon the bowels, pushing them upwards at the same time. half a minute or less the water will be driven out sufficiently commence artificial respiration.

3. Turn the patient on the back, with the head still a little er than the body, and make upward pressure on the bowels. ss the right hand upwards toward the spine until you hear air passing out of the mouth. Commence first slowly, and ing driven the air out, remove the hand that the air may er again. Then make upward pressure again, trying rather exhaust the air thoroughly than rapidly. Three or four tions will be sufficient at first, then gradually increasing to or fifteen a minute, until there are evidences of life, or it is in that it is extinct.

The writer, who, from a residence for a number of years near the sea-coast, has been called upon to manipulate with drowned bodies, has been compelled from the force of circumstances to devise a method that might be carried out irrespective of any help. In reasoning out a method, the deductions were made from the explanations given in the first part of this article.

1. That air is necessary to sustain life.

2. That certain organs are used for the reception and dissemination of air through the blood.

3. That certain organs are used for the introduction of air into the first-named organs.

4. That a certain systematic mechanical movement is necessary to set these organs in motion and keep them going.

5. That nature has adopted the easiest way of producing such movements.

6. That all substances should be removed that would impede such movements or the reception of air.

7. That natural warmth must be restored.

8. To use such agents as will effect the work speedily.

1. Cleanse the mouth, nostrils and face with a cloth or handkerchief, before the body is disturbed.

2. Tie a knot in a cloth or handkerchief, and draw it in the corner of the mouth between the teeth. This presses down the tongue, and keeps the mouth open, saving the necessity of an assistant to pull out the tongue.

3. Turn the body toward the right side, over on the face, with the head resting on the arm of the body, or anything else, to raise it three or four inches from the ground. By turning the body toward the right side, the gravity of the fluids in the stomach will force a certain amount through the pyloris, which is relaxed in asphyxia. After the body is turned on the face, clasp the arms around the body, interlacing the fingers just below the hollow of the breast bone, or over the pit of the stomach, then give several quick jerks with the interlaced fingers, upward, as if trying to jerk the breath out of the body. This produces the same movement that the stomach undergoes in vomiting, and will eject the contents of the stomach, also it will force from the trachea, froth, water, or other foreign substance that may have penetrated to the lungs. A few seconds will serve for this purpose.

4. To excite respiration, turn the body on the back; with one hand press heavily and suddenly on the pit of the stomach, while with the other hand just above it press the chest inward and upward, then release it quickly, then grasping the body around the waist, with the operator's arms under the patient's arm-pits, raise the patient forward gently and quickly to a sitting posture then lay it down again and press the pit of the stomach as before. The pressure upward creates an impulse toward the heart, as well as an expiration. In lifting the body, the weight of the abdominal viscera serves to draw the respiratory muscles down, which produces inspiration, while laying the body down, and, pressing upon it, pushes the diaphragm up, producing expiration.

5. As the body is grasped to raise it, the operator should slap the sides of the chest below the ribs, to excite action of the phrenic nerve. These motions should be repeated about twelve times a minute. As soon as breathing is established, remove the wet clothing, replacing it with that which is dry and warm, even if it be the operator's own coat. The above can all be accomplished by one person, and had better be done mostly by one, even if assistants are near.

When there are bystanders or assistants at hand, while the operator is going through the method of respiration, let some of the others strip the patient of wet clothing, keep the chest bared to the waist, get hot water and dash it upon the chest to produce shock. Let others rub the extremities and limbs briskly and upwardly, either with the hand or warm cloths or blankets.

If when a person is taken from the water the fingers are contracted or hands clasped, it may be considered an evidence of remaining vitality, and should stimulate to exertions until relaxation shows returning consciousness or the presence of death.

After persons have been recovered, they should be warmly covered and remain undisturbed, if possible; or, if necessary to remove them, let it be gently done, and give them a little coffee, with animal broths, to aid returning vitality, as there is danger of a secondary shock after apparent recovery from drowning, which is just as severe as the original asphyxia.

Galvanism has been recommended, but the only really serviceable way in which it can be applied is by means of needles

thrust into the intercostal, pectoral and diaphragm muscles, so as to reach the branches of the phrenic nerve and the larger nerves of the solar plexus.

Government, like a good parent, has expended vast sums of money to save the lives of her children along her maritime coasts, but the outlay has not always been judiciously made. Except the regulations given above, there is nothing placed in life saving stations, in the way of appliances, for restoring the drowned. There should be a galvanic battery and abundance of blankets, as well as the means of providing warm water in case of need, in much larger quantities than could be obtained from a small stove and small kettle. There should be also some means of communicating from station to station when assistance is needed, as is sometimes the case. But in all probability the deficiencies that may be apparent in the Government life saving appliances, will be remedied ere long.

Below is given the record of some cases where the parties have been successfully treated by the writer's method:

Some years ago an accident occurred at Tom's River, in this State, where a number of persons were precipitated in the water. Master W. was taken from the river in about eight minutes after the accident, as nearly as the time could be computed, and was resuscitated in about thirty minutes.

At the same time Miss S. was taken from the water, while the attendants were engaged with Master W., so that she must have been in some time longer. She was fully resuscitated in an hour, but came very near dying from secondary shock in about two hours after resuscitation, and was saved after only the most strenuous exertions by means of artificial respiration, friction and stimulants. She, however, fully recovered, and is still living.

Master D. while sailing in the river had his boat capsized by a flaw of wind, and sank after about one minute's struggle. The coachman, seeing the accident, procured a boat and rowed to his assistance. He found him grasping the grass at the bottom of the river, in water about four feet deep. From the time that the accident occurred until he was taken from the water, not less than ten minutes must have elapsed, and from the time he was brought to shore until medical assistance could be obtained was fully ten minutes more, so that twenty minutes elapsed before efforts for artificial respiration were made. In fifteen minutes

he gave the first gasp, and was breathing regularly in forty-five minutes. He was still living a few years ago when last heard from.

Miss A., from the South, while bathing in the ocean, was carried beyond her depth by the force of the current. From the time of the discovery of the accident until the bathing master could reach her with his boat, not less than six minutes could have elapsed. To obtain medical assistance occupied ten additional minutes. Natural respiration commenced in fifteen minutes after first manipulation.

Mr. R. while fishing was upset in a collision, and becoming entangled in his boat, was dragged some distance. When rescued he was inanimate, but there was no means of determining the length of time he had been so. When brought to shore, there were persons who had seen artificial respiration practiced, and commenced efforts at restoration. When medical assistance arrived, it was more than an hour after the accident, and he was breathing regularly. Those present thought they had been occupied about fifteen minutes before he gave a sign of returning animation.

Fortunately, the opportunities for exemplifying any rational method of treatment for the drowned are rare. A period of years necessarily elapse before any system can be verified, except by way of experiment upon animals, which as far as artificial respiration is concerned, is very unsatisfactory. Hence the writer has had no opportunity of comparing his plan with that of any other person operating. His attention was called to the subject by reason of living near the sea-side, where casualties occur every year. It was evident that some method of resuscitating the drowned should be devised, where one person could do the whole work in the easiest and speediest manner. Much valuable time is often wasted in giving others directions what and how to do, and in having these inefficiently carried out from the over-zeal or over-excitement of those assisting. Hence this simple plan which we have found effective, together with some reasons therefor, derived from a study of natural methods, and tested by the demands of actual practice.

November 7th, 1879.

ADULTERATION OF FOOD, ETC.

ALBERT R. LEEDS, PH.D.

There are certain well-understood and natural standards, by which the purity and genuineness of any commodity used as food are judged, and any willful debasement below these standards for purposes of gain is adulteration. The adulteration may be effected either by the addition of substances for the purpose of increasing the bulk or weight, or to change and improve the appearance, or to artificially increase the strength, or it may be effected by the abstraction of some of the more valuable constituents. When willfully done, all of these alterations are *fraudulent;* when they arise in the process of growth or manufacture without intention, they are to be classed as *accidental,* and blameworthy only when a want of due care can be proven. Of the fraudulent adulterations, there are three kinds—the harmless, the deleterious and the poisonous. The examinations given later were made to find out the character and extent of these three classes of adulterations at the present time. And it should be carefully borne in mind that hasty and sweeping generalizations upon these subjects are of necessity misleading, because the nature and extent of the adulterations practiced from time to time, vary with the abundance or scarcity of particular commodities, with the sharpness of competition in trade, with the ignorance or alarm of the community, and with the absence of, or unwise or wise, legislation upon the subject. But sufficient, I think, has been done to warrant me in asserting, that adulterations of a kind advantageous to the pocket but not injurious to the health, though extensive, are by no means so great as is popularly supposed; in the second place, that deleterious adulterations are limited to a few commodities, and that with the exception of the use of poisonous pigments to a very limited degree in candies, and of arsenic in wall-papers and articles of use and wear, there is no good evidence of the use of poisonous adulterants whatsoever. The statements which have been going

the rounds of the press to the effect that cayenne pepper, mustard, curry powder and other spices, are adulterated with compounds of lead and mercury, that sulphuric acid is commonly used in the making of vinegar and certain wines, that milk is ordinarily adulterated with anything more dangerous than water, that pickles are frequently colored green by copper, that teas contain salts of copper and arsenic, etc., etc., are, in the light of any investigations made by chemists of good repute in this country, utterly false. While no pains should be spared by Boards of Health to ascertain the facts, and from time to time warn the public concerning adulterated commodities, yet the reiterated publication of such absurd and exploded fictions as the above, should bring down upon their authors, as it has, the contempt and derision of a better instructed community. With these words of introduction, let us pass to a consideration of the results obtained in the examination of certain of the principal articles of food.

BREAD.

It is stated that potatoes are frequently, and indeed commonly, used in the making of baker's bread. They cannot properly be called an adulteration, because the bread so made is excellent and palatable, as I have found from the constant use of such bread in my own household. The receipt used calls for half a pound of boiled potato to three and a half pounds of flour. The objection is that bread made in this manner, and by the use of potato yeast as well, holds more moisture than that made entirely from wheaten flour, which is an extra profit to the baker when the bread is sold by weight. We did not specially inquire into the substitution of inferior or damaged flour in place of superior flour, for two reasons. In the first place, at the time of making these inquiries the price of flour was exceptionally low, and the temptation to lower the quality of the bread proportionally small; and in the second, the buyer must and does discriminate between sweet and nutritious bread and the reverse. It is the attempt to improve the appearance of bread made from inferior or damaged flour, by the use of deleterious substances, such as alum, blue vitriol, borax or white vitriol, that is more especially inimical to health, and to the search for these bodies, and for chalk as well,

which is said to have been detected in some instances in bread, our efforts were directed. But in no case, though a number of loaves made by bakers largely supplying the poorer classes were examined, were any of these adulterants found except alum. In the ash of two samples an amount of alumina was found, corresponding to seven grains of alum to a four-pound loaf. In another sample, alumina corresponding to a weight of eight grains of alum in a four-pound loaf; in another to fifteen and one-quarter grains; in another, and the worst sample, to twenty-three grains. Admitting that as much alumina as would be equivalent to eight grains of alum might be derived from the ash of the flour in its natural condition, an admission usually made in the analysis of bread by the public analysts of England, yet the above results would appear to warrant us in believing that the use of alum in bread-making is practiced to a certain extent.

According to Liebig, the addition of alum renders the bread very light, elastic, firm and dry, but at the same time a combination with the phosphoric acid present is probably formed, and this phosphate of alumina being with difficulty soluble, tends to diminish the digestibility of the bread so made. Moreover, according to Liebig, alum forms with the gluten of the meal an insoluble compound. These opinions of Leibig are much disputed at the present time, but in the absence of very convincing arguments to the contrary, we prefer to adhere to the teachings of that illustrious chemist. With regard to blue vitriol (a poison), which has the same effect on poor or damaged flour as alum, there is no question. As above stated, I have no positive testimony gained from analysis performed in my own laboratory, but in this connection it is important to note the results obtained by Dr. E. Waller, in the examination of bread sold in the city of New York.*

Of the fifty-one samples examined, he found all but fifteen contained minute amounts of copper. But as the amounts were excessively small he was led to examine other articles which might at times be used in bread-making, such as potatoes, white and yellow Indian meal, and found they contained traces of copper. In baker's yeast, no traces could be found. Besides the above sources of copper, in the majority of cases the amounts of

*Report of Board of Health of New York, 1873, p. 449.

copper found were not greater than might have been derived from the use of copper utensils in preparing the bread, or th materials used in making it. In only two cases was the amoun of copper so great as to render it probable that it had been inten tionally added in the making, and in these cases probably di not exceed two-fifteenths of a grain of sulphate of copper to th pound of flour. Six other samples were probably adulterate with alum, and two contained both alum and copper.

SALERATUS.

The probability is strong that but little systematic adulteratio of this substance is practised. In various samples purchased i Hoboken, and examined for impurities, none were found.

Of twenty-eight samples sold in the city of New York, an examined by Dr. E. Waller,* all but two consisted of bicarbonat of soda more or less pure. The impurities were mainly commo salt, sulphate of soda, lime and silicic acid, and were due to th process of manufacture of the bicarbonate. In one of two excep tional cases, the adulteration consisted in the addition of flour, harmless though fraudulent dilutent; in the other, in the ad dition of nearly twenty-five per cent. of sulphate of lime, o *terra alba*.

CREAM OF TARTAR.

The cream of tartar examined by Dr. Waller, was found to b in all cases adulterated with *terra alba*. To such an extent wa this injurious substance added, that in most samples, the *terr alba* predominated. In one case 61 per cent. of *terra alba* wa found, in another 86 per cent., so that, according to Dr. Walle "the cream of tartar sold in New York is shamefully adulterate —more so, probably, than any other article sold by the grocers.

Among the samples purchased in New Jersey, sulphate of lim was found to be a common adulterant, the percentage in on instance amounting to 34.04 per cent. The adulteration i one so easily carried on, and so unlikely to be detected by th casual buyers, that it appears to be very extensively practised

*Report of Board of Health of New York, 1872.

BAKING POWDERS.

The essential constituents in the best baking powders are cream of tartar and bicarbonate of soda, to which are sometimes added tartaric acid and carbonate of ammonia, the salts being prevented from mutual decomposition by the addition to the mixture of a little starch. A number of samples examined by the author were found to be unadulterated. They were of kinds in extensive use and bore an excellent reputation, two of them having been ordinarily used in my own household. But during the course of the past year, very many analyses of these powders have been made by Dr. H. A. Mott, and he has found that they are largely adulterated, alum, *terra alba*, etc., being used in the manufacture of a large number of them. In one variety, known as the "Patapsco Powder," there was 20 per cent. of burnt alum; in "Andrews," 22½ per cent.; in the "Charm" baking powder, 30 per cent., and in "Dooley's Standard Baking Powder," 26½ per cent. No cream of tartar was used in any one of these powders, while in one of them the starch amounted to 57 per cent. Since the time of his earlier publication,* the statements therein having been challenged, Dr. Mott has continued his inquiries, and has already reported twenty-three brands of baking powder as being made with burnt alum, the total number probably being much greater.

SUGAR.

Several samples of white sugar, differing in the fineness of the granulation were examined. They were found to contain no mineral substances, except those naturally contained in the minute amount of ash, *no metallic bodies, even in traces*, no glucose, and no flour or starch. So far as the chemical tests applied could show, and to the best of our knowledge and belief, these sugars were pure. They were purchased at the meanest shops in the poorest neighborhoods.

With regard to the use of glucose in brown sugar and molasses, I am unable to speak from personal knowledge. It is the opinion of Prof. Sharples, that if the former is the case, it must be very seldom, since he records but one case within the last two

*Scientific American, Nov. 16th, 1878.

years.* According to Prof. R. C. Kedzie, the adulteration of table syrups with glucose is practiced to a very great extent. While the glucose itself is harmless, it is a loss to the consumer in the respect that its sweetening power is much less than cane sugar, one pound of the latter having, it is said, the same sweetening power as two and a half pounds of glucose. Moreover, in the table syrups examined by Prof. Kedzie, the glucose was frequently accompanied by large amounts of deleterious substances, one sample containing, in the gallon, 71.83 grains of free sulphuric acid, .28 grains of sulphate of iron, and 363 grains of lime. The serious illness of a family was attributed to the use of this particular syrup, and there were other samples examined in which the adulteration was still greater. Of seventeen specimens of syrup examined, two were made of cane sugar, and fifteen of glucose.

CONFECTIONERY.

In an extended examination made by Dr. H. Endemann† of the candies sold in the city of New York, special attention was paid, 1st, to those substances which were employed to take the place of the sugar, in other words to give "bulk;" 2nd, to materials used in coloring; 3d, to extracts employed in flavoring. Of substances of the first class, clay, gypsum, starch, and lampblack were found; the first body named being present to the extent of 3.6 per cent. in some lozenges. The last as an admixture in liquorice gum-drops.

The red coloring matter was found to be either carmine or analine red, both of which, when used in such small amounts, are harmless. Other red colors, like vermilion and minium, which are poisonous, were not detected.

Blue colors were either ultra-marine or Prussian blue. The yellows were chromate of lime, chromate of lead, chromate of baryta, gamboge, saffron and various yellow plant extracts. Of ten samples of yellow colors examined, five were found to consist mainly of chromate of lead. No copper or arsenic was detected in the green colors examined.

While the flavoring extracts were mainly artificial, and while the ethers composing them are poisonous when taken in consid-

*Treatise on Hygiene and Public Health, Vol. II, p. 370.

†Report of Board of Health of New York, 1872.

erable quantities, yet it is questionable, according to Dr. Endemann, whether, when taken in a highly-diluted state, they are to be regarded as poisonous. According to Prof. S. P. Sharples* even the perfectly white candy, which is free from injurious coloring matters, is frequently flavored with fousel oil (essence of banana), oil of bitter almonds (nitro-benzole), prussic acid in various forms known as almond flavor, and various other essences and extracts which are poisonous in their nature, and which are used in large excess by the makers in order to give a strong flavor. The same authority states that glucose sometimes makes up almost the entire bulk of candy, and that most candy probably contains it to a greater or less extent. In such cases, the injury arising from the adulteration does not result from the glucose, but from the free sulphuric acid and the excess of sulphate of lime which commercial glucose is apt to contain.

I have quoted thus largely from the results of examinations made in New York and Massachusetts, for the reason that my own analyses of candies, which were confined to the search for *deleterious* constituents and flavoring matters, did not show their presence. And while there can be no question of the existence of injurious adulterations, yet that they are universally or even generally practised would appear not to be the case.

STARCHES AND FLOUR.

An examination of several samples of starch was made with the microscope, but no impurities were detected. Their chemical and physical properties, also agreed perfectly with those of genuine starch. No examinations of flour were made, because there was no reason for suspecting that any adulteration of this article was practised at the present time in this country, the employment of flour made from damaged wheat not being a matter coming within the scope of the present inquiry.

MILK.

A great amount of sensational literature has been published concerning the adulteration of milk, it having been asserted that it is customary to add to the milk sold in our large cities whiting,

*Adulteration of Food. Treatise on Hygiene and Public Health, vol. II, p. 363.

magnesia, chalk, and even sheep's brains. These statements are entirely negatived by the testimony of all the gentlemen who have been officially charged with the inspection of milk, *the addition of water to dilute and of caramel to color*, according to their statements, being the sum of the adulterations. It was, of course, quite needless to multiply analyses of milk under these circumstances—the important matter was to discover what means had proven effectual in suppressing the evil. At the outset great difficulty was encountered for the lack of an authorized standard as to what should be entitled pure milk. This difficulty has been overcome, the New York Board of Health having succeeded in establishing in the courts of law that the specific gravity of pure milk shall be taken at 1.029; while in Massachusetts, Rhode Island and Maine a chemical analysis of the milk is required by law, and it must be shown not to fall in the percentages of its essential constituents, below certain standards generally accepted at the present time in this country and in England.

It is stated that during the years 1874–75*, thirty-seven convictions were obtained in the city of New York under the sanitary ordinance covering the adulteration of milk, and the opinion is emphatically expressed that the arrest and prompt punishment of those who tamper with an article of daily use has already been attended with salutary effects, and, if successfully continued, must ultimately stop the evil. "The practical lesson to be drawn from the experience of many years, and of many City Boards of Health, is that statutes alone are powerless to guard against the watering of milk, which will always be practiced to a greater or less extent, unless the watchful supervision of a competent inspector is brought to bear against the evil." The same result has followed the systematic warfare which has been waged in Boston and elsewhere, against the practice of watering milk, as may be seen from the writings and reports of Messrs. Sharples† and Merrick,‡ State Assayers of Massachusetts, and Mr. H. W. Vaughan, State Assayer of Rhode Island.

*Report of Board of Health of New York, 1874-75, p. 64.

†Milk Analysis, Proc. Amer. Pharm. Ass'n. Milk Analyses, Proc. Amer. Acad. Arts and Sciences, Boston, Vol. XII. 1877.

‡13th Annual Report, Boston Milk Inspector, 1878, p. 21.

TEA AND COFFEE.

In the examination of teas, attention was directed to the determination of the percentages of ash and of tannin; to the analysis of the ash for the discovery of foreign mineral substances, and to the examination of the structural characters of the leaves under the microscope, in order to detect the presence of other plants.

An analysis by Mulder of black and green teas, gives for the percentage of ash in the former 5.24 per cent., in the latter, 5.56 per cent.; his determinations of tannin, give for black tea 12.88 per cent., for green tea 17.80. While the analysis of various kinds of tea, representing tea grown on various soils, in different seasons and collected at different ages of the plant, afford other percentages for the ash and tannin, yet it is safe to say that any wide discrepancy from the above results, would indicate either that we were dealing with teas containing foreign mineral substances, or with teas largely admixed with the leaves of other plants.

A sample of what was sold as medium Japan tea, yielded, according to one analysis, 6.6 per cent. of ash. A duplicate specimen of the same, gave 7.0 per cent. of ash. This high result pointed to the probable presence of foreign mineral matter. Under the microscope, many leaves other than those of the tea-plant were found.

Mixed tea, sold at the price of thirty cents per pound, yielded 6.5 per cent. of ash, and contained 7.9 per cent. of tannin. It was free from foreign mineral matters, but had abundance of other leaves.

"Mixed" tea, sold at twenty-five cents per pound, yielded 6.9 per cent. of ash, and contained 8.2 per cent. of tannin.

Examinations were made of a number of low-priced teas in a similar manner. After soaking, the leaves were mounted on glass slides, and compared under the microscope, both with the leaves of what was sold by the most reputable grocers of New York, at the highest prices, for genuine tea, and with the microscopic enlargements of the genuine leaves of the tea-plant, figured in Hassall's standard work on the "Adulteration of Food." In the lowest priced teas it was difficult to find in

this manner, any genuine leaves whatsoever. The low percentage of tannin found in such samples, likewise indicates the probable presence of a large proportion of foreign leaves.

It is stated that plumbago, indigo, Prussian blue, clay, soapstone, gypsum, etc., are employed either in the facing of teas or to give weight. The small percentage of iron found in the ash of the teas examined, would appear to show, that if Prussian blue were employed at all in facing them, the amount used must have been insignificant. The other mineral matters enumerated in the list given above, we did not succeed in finding. Sufficient evidence, however, was afforded by the microscopic and chemical examination, to show that while the adulterants of tea are mainly harmless, they are added to such a degree as to make it one of the most adulterated articles of food.

The samples of coffee examined, on the contrary, did not appear to be mixed with chickory or other foreign berries, and although of very poor quality in many instances, they were not adulterated.

MUSTARD.

Mustard is made from the seeds of the black and white mustard plant, and, when pure, consists of the flour made by crushing and sifting these seeds, together with more or less of the husk. Any foreign substance, whether vegetable or mineral, is an adulteration. It is stated that clay, chrome yellow, chromate of potash, cayenne pepper, gypsum, gamboge, turmeric, ginger, yellow ochre, potato starch, pea flour, wheat flour, and the flour of various foreign seeds have been used as adulterants, but of this list none were found in the various samples of mustard analyzed, except clay, gypsum, turmeric and wheaten flour. The samples analyzed were purchased at the localities named: No. 1, ——— ———, Hoboken; No. 2, corner of —— and Willow streets, Hoboken; No. 3, corner of —— and James streets, Newark; No. 4, "Bovine" mustard; No. 5, "Colman's" mustard. The table of analyses gives, in addition to the adulterations found, the percentage of ash and fixed oil. Pure mustard contains from 3.7 to 4.7 per cent. of ash, and if the percentage falls below this amount, some organic adulterant is probably present; if, as is more likely, the percentage exceeds this amount, some mineral

substance. The percentage of fixed oil, in like manner, should be included within 33.9 and 36.7 per cent. The amounts of mustard given as present, were calculated from the amounts of fixed oil found, and, of course, can be regarded only as approximate determinations. The clay and gypsum might, to a certain extent, have been introduced in the form of dirt, and, as such, would be classed as accidental adulterations. The flour and turmeric have been customarily added to mustard to improve, it is so stated, its palatability, and to heighten the color. The practice, it is moreover said, is so well known and allowed, that the adulteration should be regarded not only as harmless, but in no sense fraudulent.

TABLE OF ANALYSES OF COMMERCIAL "MUSTARD."

Sample.	Ash.	Oil.	Mustard.	Wheat Flour	Turmeric	Clay.	Gypsum
I.	4.60 p. c.	17.45 p. c.	44 74 p. c.	Present.	Absent.	Present	Present.
II.	11.67 "	24 00 "	63.40 "	"	Present.	(Salt.)	"
II.	4.64 "	21.30 "	55.60 "	"	"		
V.	18.38 "	20.28 "	52.70 "	"	Absent.	Present	Present.
V.	3.78 "	30.14 "	81.10 "	"	"	Absent	Absent.

No. II. contained a large quantity of common salt, together with vinegar. As it was already prepared for table use, these ingredients were introduced in the process of mixing.

No. III. contained very slight traces of mineral substances, not fairly attributable to the ash.

The percentage of ash in No. IV. is very great, 18.38 per cent. and it is difficult to account for so large an excess above that found in genuine mustard, except on the supposition of intentional addition.

The application of the name mustard to "mixtures" of mustard and flour, though sanctioned by immemorial usage and defended on the ground that mustard, without the addition of flour, is too pungent for table use, we regard as a serious mistake, and one, which, if corrected would benefit both the purchaser and honest manufacturer, for were the spice sold as a mixture, the

amount of pure mustard it contained being stated, the honest manufacturer would be put into a position to secure the just reward of his honesty, and the purchaser would know how much of what he paid for was mustard and how much was flour or something else.

VINEGAR.

The adulterations looked for, were the mineral acids, nitric, hydrochloric and sulphuric, though more especially the latter: the organic acids, pyroligneous acid, tartaric, malic and citric acids; metallic substances of every kind, but more particularly, lead, copper, arsenic, zinc and tin. The percentage of acetic acid in every case was likewise determined, since in good vinegar, this percentage should not fall below 4 per cent., and a lower percentage than this indicates the presence of an undue amount of water.

The samples were purchased as follows: No. 1, corner of —— and Willow streets, Hoboken. No. 2, corner of —— and Grand. No. 3, corner of —— and Grand. These, with another sample, No. 0, whose place of purchase was not noted, were all purchased at the price of five cents a pint, and this price was asked, so far as we could ascertain, by the grocers generally throughout the city. And yet the purchaser could have ascertained by his own taste and inspection, that the vinegars thus sold were of very different strengths and quality, the amount of acetic acid in one case being as much as 25 per cent. greater than in another.

No sulphuric or other acid, except acetic, was found in any sample.

No copper or other metal was found, except *lead*.

Lead was present only in traces; even in No. 2, a white vinegar in which the largest amount of lead was found, the quantity was very minute. Sample 1 contained 4.2 per cent. of acetic acid; 2, 4.10 per cent.; 3, 3.4 per cent.; 0, 4.5 per cent. So far then as the strength of the vinegar is concerned, none of the samples can be regarded as falling below the standard, except No. 3, which contained only 3.4 per cent. of acetic acid. The sample No. 1 contained myriads of the "vibrio aceti," and other animalcules, multitudes being visible even to the naked eye.

PICKLES.

Diligent search was made for pickles of suspicious appearance, and numerous stores were visited with the expectation of finding some pickles to which a bright color had been communicated by artificial means; but the search was unsuccessful, and the samples analyzed in the laboratory afterwards, proved to contain no deleterious ingredient. Especial attention was given in the search for traces of *copper*, but none whatever were found.

These remarks apply not only to pickles of superior quality, like those bottled and labelled by Thurber & Co., N. Y., and Crosse & Blackwell, England, but to samples bought haphazard in numerous stores and not bottled.

CANNED VEGETABLES AND MEATS.

Uneasiness in the use of canned vegetables and meats has been created by reports of many cases of sickness so arising. When the meats have been tainted or improperly canned, sickness might be so produced; but to discover by the examination of canned articles that they were of a dangerous quality was, obviously, a very difficult matter. We contented ourselves, therefore, with an examination of canned corn, tomatoes and other vegetables,for metallic impurities, especially lead,tin and copper. In the cans which were examined such impurities were not found. In one instance, however, several globules of mercury of considerable size were discovered, probably due to the accidental breaking of a thermometer employed during the canning. The following important paragraph has been condensed from a report published in an English scientific journal concerning the use of *canned peas.*

In the city of London, in 1877, the vendors of several cans of prepared peas, in which the analyst of the district, Mr. C. H. Piesse, had found quantities of copper, varying between a quarter and a half grain, were fined. In the medical evidence adduced in connection with the case, Dr. Parry took the ground that since copper is found in minute traces in the human body, it might legitimately be used in the preparation of peas for human food. But Dr. Guy, Dr. Dupre and Dr. Tidy all took the ground that the *smallest* admixture of copper, when contained in any

preserved article of food, ought to be viewed as an adulteration. The copper, it is well known, is added solely for the purpose of improving the color of the preserved vegetables, and so giving a fictitious value to an otherwise inferior article.*

CAYENNE PEPPER.

No compound of lead or mercury were found in the samples examined. In one sample the ash amounted to 5.4 per cent. and in another to 15.6 per cent. Both contained some red ferruginous earth, the latter sample in considerable quantity. It is stated that the ash of the unground pods is colored red from the presence of oxide of iron, and the red ferruginous matter may possibly have been derived from this source; but the very large percentage of the ash in one sample certainly makes it questionable whether or no in this instance the adulteration is to be regarded as an accidental one. Terra alba as well was found in the latter sample.

LIQUORS.

The charge constantly made that liquors are enormously adulterated, has not been substantiated in the cases where analyses have been made by competent persons. In the report made by the Massachusetts Inspector and Assayer of Liquors, he states as the result of his examinations during the past two years, that in the ardent spirits (brandy, whisky, gin, rum, etc.,) examined, water, sugar, caramel or like coloring matter, and in one case methylic alcohol, were the only adulterations found. No cocculus indicus, strychnia, picric acid, nor any other bitter except that of hops and malt, was found in the samples of beer examined, and the wine contained nothing but what was naturally derived from the grape.

A great number of samples of whisky, including what was vended at the meanest liquor saloons of the city, were examined a short time ago under the auspices of the New York Board of Health, and the badness of the samples consisted in the increasing amounts *of water and fousel oil*, which they contained.

This result is similar to that recorded in the Report on Food and Drugs, recently published by the English Commissioners of

*The Analyst. vol. I, pp. 183, 203.

Internal Revenue. The samples of whisky which were sent up to the Board for examination, were carefully examined, but no adulteration was found, except the presence in one of the samples of some pungent matter resembling cayenne pepper. The suspicions had probably been caused in large degree, by the use of new spirit containing an excess of fusel oil and other natural impurities.

In the two samples of gin which were sent upon the charge of adulteration with water, the Board did nothing except to make a determination of the strength, leaving, in the absence of a standard as to the degree to which gin may be adulterated, the question of undue watering or otherwise to the consideration of the Justices. Of the beer examined, one sample contained a certain amount of salt, which, on examination, proved to be no greater than what was naturally present in the ingredients used in brewing; two brewers were detected using grains of Paradise, and one was found using licorice.

The same report supplies much evidence to show that the popular impressions concerning adulteration are greatly exaggerated, for of the 14,244 samples of suspected articles examined at the government laboratory at Somerset House, but a comparatively small number were shown to be adulterated. Besides the liquors just mentioned, a few of the more important articles may be spoken of by way of illustration. A sample of pepper was alleged to be adulterated with sand, but the quantity which was found was not more than may be present in pepper in the whole state, as imported. Of three hundred and twenty-five samples of tobacco, sixty-eight were found to be adulterated, the adulterations being sugar and licorice; cigars, certified by the local analyst to contain opium, proved, on examination at the government laboratory, to contain not the slightest trace of that drug. Coffee, however, was found to be frequently adulterated; the adulterant most recently detected being date stones, which after being roasted, ground and mixed with the coffee, readily deceive the general public.

COSMETICS.

Since substances detrimental to health are frequently employed in the preparation of cosmetics, some well-known articles of this class were examined with the following results:

Mme. Rachel's Toilet Cream.—Purchased at a pharmacist's in Washington street, Hoboken, at the price of sixty cents per bottle. It consisted largely of finely powdered carbonate of lime or chalk, and carbonate of magnesia, suspended in water to which some perfume had been added. No metallic salts were present, except a trace of iron and some oxide of zinc—the latter in not inconsiderable quantity.

McNeil's Sulphur Cream.—It is composed of sulphur and oxide of zinc. No other substances were found except traces of lime and magnesia.

Lily White.—This consisted of gypsum and a fine white variety of unctuous clay, with no organic matter, other than that due to the small amount of perfume present. This was probably the least deleterious of the cosmetics examined, and while having a tendency to close up the pores of the skin, would probably do as little injury as any of the bodies of its class.

The various preparations used in dyeing the hair were not examined, since the presence of lead in large quantities in these dyes has been recently exposed in the reports of the New York Board of Health, and the many serious consequences to life and health resulting therefrom abundantly pointed out.

DISINFECTANTS.

There is considerable danger of the public being imposed upon by the sale of disinfectants, which have received fanciful names, and while containing nothing but low-priced and familiar disinfecting substances, are sold at prices much exceeding their commercial value. It is safe to say that the best disinfectants are generally well known, and have been put to extended use and most severely tried by sanitary authorities in this and other countries. The State Board of Health of this State has circulated thousands of circulars, giving precise directions concerning the nature and employment of the most reliable disinfectants. Hence the advertisement of these bodies or mixtures of these bodies either with one another or with inert foreign substances added to increase bulk or weight, under fanciful names which give no indication of the true composition of the disinfectant, can have the tendency only to mislead, and to a certain extent defraud, the purchaser. Where copperas

chloride of zinc, blue stone, etc., are sold under their own names, the amount to be applied can be intelligently determined. But if disinfectants of unknown composition are used, the amount to be applied cannot intelligently be decided upon, nor can the remedy of the proposed evil be certainly brought about.

Of this character is the "Instantaneous Disinfectant Powder," sold by the New York Deodorizing Company, 170 Broadway, New York, at the price of twenty-five cents per pound. It consists principally of ferruginous clay, with some common salt and sulphate of iron.

The same remarks apply to the "Sanitary Solution," sold by the same company, at the price of fifty cents per pound. It is a solution of blue stone and chloride of zinc in water.

ARSENICAL COLORS.

Although a subject not directly connected with the adulteration of food, etc., yet the common employment of arsenical colors in objects intended for household use early attracted the writer's attention. The presence of large amounts of arsenical pigment in the brilliant green wall-papers in very common use, was confirmed by the examination of a great number of samples. Recently, the State Board of Health, of Michigan, in order to impress upon the people the extent to which this manufacture of arsenical wall-paper is carried, has issued to the principal libraries of the State one hundred copies of a volume containing samples of such papers, and reports of the very numerous cases of sickness resulting therefrom.

It would be difficult to enumerate all the articles of common use in which arsenic is present, sometimes very unexpectedly. Recently, the author found in a green taper, used by the children in a toy house, a considerable amount of the arsenite of copper. Besides wall-paper, letter-paper, fancy paper of various kinds, card-board, printed tickets, etc., are colored with arsenical pigments. Artificial flowers, green papers used in the ornamentation or wrapping of candies, green tarlatan employed as an article of dress or in the protection of picture-frames, chandeliers, &c., are similarly colored. Since these arsenical pigments are simply fixed upon the fabric by the use of starch

or size, they readily detach themselves, and float in the surrounding air.

CONCLUSION.

Having endeavored to ascertain, as far as the time and means at our disposal would allow, the facts concerning the matter of adulteration, it will be proper in conclusion to say a few words concerning the means of regulating the evil, and of restraining it within as narrow limits as possible. We regard these as:—

Primariy, a sensitive public morality upon this matter, aided by the co-operation and sympathy of the press. These we have; the public being heartfelt in its denunciations of the crime, and the press being keen and vigilant to ferret out and expose the adulterator and his wares.

Second, the duty of Health Boards to examine at frequent intervals into the purity and genuineness of articles of food and medicine, and to keep the public instructed upon these points.

Third, to discover what legislation would be wise, and then to have it so explicitly enacted that the laws would really defend the public, and not, as has frequently been the case, shield the adulterator.

Finally, the appointment of a suitable number of public analysts and inspectors, whose duty it shall be to see that the provisions of the law are carried into effect; since otherwise, the experience in England and elsewhere has shown, the laws concerning adulteration remain but dead-letters on the statute-book.

DISINFECTION.

EZRA M. HUNT, M. D.

The design of disinfection is to remove from the air about us either those infective particles which are the cause of specific diseases, or to correct any deterioriation of air which is unfriendly to general health. The air for instance may have in it atoms floated off from a scarlet fever patient. If so, we seek by scattering them to diminish the probability of infection. Or by active ventilation we may drive them completely away. Or it is possible that we may so neutralize them by some chemical or other action, or so absorb them, as to remove their infectiveness. Or it may be that by a treatment of the person we may place him or the parts of him which come in contact with the air in such a condition as to be refractory to the reception of the floating particle. Practically it is found that free and continuous dilution of the air greatly limits its infectious power. It is probable that this is more than mere dilution or driving away. Where air is actively in motion, it is so brought into contact with infected particles as the more rapidly to change them, so as to deprive them of their power to impart a special disease. At any rate no fact is more fully established than that ventilation is favorable to the limitation of the infective diseases.

There is also demand for disinfection of such air as may not be laden with specific infective particles like those of scarlet fever or small pox, but which nevertheless is befouled by organic matters of various kinds. Such air is greatly prejudicial to health by causing a lowering of vitality or an irritation of important organs, and so often gives rise to consumption, stomach and bowel affections, and to other maladies affecting the whole system. So much is this the case that foul air is believed to be generally the most potent excitant of disease. Mere dust in the air may irritate mechanically, or its conditions of heat and moisture may favorably or unfavorably affect those who breathe

it or are surrounded by it. These however do not come within the remedial agency of disinfection. Neither does odor necessarily demand sanitary disinfection, since all odors are not infectious, and all apparently odorless atmospheres are not the safest. As, however, bad odor is so often a result of the gases of decay it is usually an indication for the use of disinfectants, and the cessation of the odor is an indication that the disinfectant used has been effective. We must not confound the substitution of a new odor with the destruction of a former one. When any article, having no odor of its own, uniformly counteracts foul odors, we may safely value it as a disinfectant.

AIR AS A DISINFECTANT.

Even in so elementary an outline, it is evident that we can never vacate or supersede air as a disinfectant. Air, above and beyond all other things, is the material on which we must rely to purify air. It often needs to be air in perceptible motion, and without draught upon persons, and yet moving at a rate to cause draught. Its condition of heat or moisture will have some bearing on its effectiveness as well as its own condition of purity or impurity when introduced. There is room for plain common sense and thought, as well as for scientific study on the subject.

We do not always purify a room or disinfect its air by opening a window. The direction of the wind, the condition of moisture, the unraised curtain or the distance of some corner in the room may leave the child in its bed breathing a very different atmosphere from that which exists just at the crevice made at the open window. Many a room so needs flushing with air in every corner and crevice that it can only be done when unoccupied. Five minutes of such airing is often a greater disinfectant than a window raised for a day. While it is not in our plan to discuss ventilation, we cannot properly advert to disinfection without an endeavor to impress the availability of air as a disinfectant, and the imperfect method in which it is sometimes applied, even when its general importance is recognized. In some states of the atmosphere, and in some conditions of crowded houses or close rooms, there is such necessity for rapid and general diffusion of new air, in cases of sickness, that we are ever to be on the alert to secure a thorough ventilation. Often there is far more risk

from closeness than from draught. Where there is danger from draught we often get help, but never complete substitution, by the use of disinfectants. When air is warm faster currents can be borne. The value of natural light, too, is not to be lost sight of, since it also aids in the purification of air.

WATER AS A DISINFECTANT.

Water can not be said to have a direct chemical action as a disinfectant. Yet it has an important service to perform. Moisture may so locate infective particles as not to leave them flying about in the air to be readily inbreathed. To this end oiling or wetting the skin in scarlet fever has been recommended as a method of fixing the particles which are shed from the skin in what is called the desquamative process. Water itself, with the air it contains, has some power of oxidizing infective particles. It is chiefly, however, as a promotive of cleanliness that the use of water is advocated for disinfection. Either in solution or suspension it conveys away organic material or promotes those chemical changes, which render them inoccuous. Yet it is to be remembered that moisture sometimes seems to promote the infectiveness of particles by dissolving or suspending them so as to be more easily absorbed. If heat is added to moisture, it awakens decay and stirs matter into activity, and so may render it more hurtful.

It is to be borne in mind that constant dampness is not favorable to cleanliness. In hospitals during an epidemic, it is not usual to scrub the ward floors and walls, as water fastens some particles to surfaces, and together with heat, seems to promote their active and deleterious agency. This does not apply to the usual working of households, or to that agency of water by which surfaces can be better cleansed than in any other way ; if only for a little time the sick can be removed during the dampness or evaporation incident to the drying process. For the cleanness of the skin, of the clothing and of much of the surrounding material of our homes, there is no substitute for water.

Neither can any system of artificial disinfection take the place of the time-honored house-cleaning so common with good housewives. The thorough cleansing of floors and walls, the overhauling of closets, bureaus and corners must be occasionally

done in this formal inspecting way, while the scrubbing, ar wiping, and carpet-shaking and removing into the open a and lime-washing make up a process too important to l superseded. In many cases of sickness, there needs to be tl same methods, as applied to rooms, which should be adopted soon as they can be vacated by the sick. Garments which a often the vehicles of infective particles are best cleansed l shaking in out-door air or by immersion in boiling water.

To those who will not thoroughly cleanse the house, the b clothing, and furniture and all garments, at stated interva frequent movings are blessings in disguise, as they do affo some opportunity for pure air to come in contact with soil materials.

OZONE.

It is claimed by some that nature has provided in the atmo phere an element in a state ready of appropriation by whic disinfection can be secured, and that when not sufficiently foun in the atmosphere it can be made available by artificial method It may be called an extra atom of free oxygen, a little mor ready than the usual oxygen of the atmosphere and holdin itself ready to compensate for any defilement of pure air fo which its services are desirable. It is defined as three atoms o oxygen, occupying the same space as two atoms of ordinar oxygen, capable of yielding up one atom of oxygen, and y ordinary oxygen remains. So it is a powerful oxidizer. Th exact availability of this agent is not yet fully defined, but it attracting so much of scientific attention, experiment and hop fulness that we need thus to make reference to it.

SULPHUROUS ACID OR SULPHUROUS ANHYDRIDE.

This substance stands at the present at the head of chemic disinfectants. It is made by burning roll sulphur, whic coming in contact with the moisture or aqueous vapor in the a is changed into sulphurous acid. The vapor thus formed destructive to insect life and to man himself, if continuing t breathe it for a length of time. It is, therefore, only applicab to the thorough disinfection of ships, rooms or houses fro which all persons can be removed. But its great penetratio

even into trunks, clothing, etc., and its power of neutralizing the gases of decay and destroying the infective power of atoms, makes it of great and essential service. Although the odor is unpleasant in clothing and other articles subjected to it, this is dissipated by airing.

A house or room is disinfected with it, thus: Close the chimney and all access to the outer air, except the doors for egress. Break in small pieces the sulphur to be used and place it on an iron plate or in a metallic dish or pan, and set this on a pair of tongs or cross-bar over an iron pot in which there is water, or over a large box of sand, so as to avoid any danger of fire from small particles of the burning sulphur. A little alcohol placed in the pan and set on fire, or a few burning coals from the stove, will light the sulphur. A pound and a half of sulphur will be needed for each one thousand cubic feet of air space. Thus a room ten feet wide and ten feet long, and with ceiling ten feet high, 10x10x10=1000, would need this amount; or a room 8x8x8=512, about half as much. So soon as the sulphur begins to ignite the person should leave and close the door tightly. The burning will continue until the sulphur is consumed, which, if the room is properly closed, should mean until the oxygen of the inside air is converted into sulphurous acid. If the room at the start is not below a temperature of fifty, the change is more rapid. It should be kept closed for from four to six hours after the burning has ceased, and then should be well aired four hours before occupancy, but should not be slept in until eight or ten hours after being opened and aired. It will hasten the disappearance of the odor of sulphur to wash the wood-work and cleanse the walls. Although the sulphur process is a little troublesome, yet it is also troublesome to catch disease from an infected building or room. We may improve the air of a room in usual cases by other methods, but we cannot rightly disinfect an infected room with the people in it. Sulphurous acid thus formed, by its pungency, its penetration and its active oxidation is now believed to be of the greatest value for this purpose. The penetration of the sulphurous acid fumes is shown by the fact that test litmus paper, placed under the carpet and between the leaves of books, is turned bright red. It was not found that colored silks or bed and bedding were injured, while feather beds, pillows or clothing, hung up and in

the room, are penetrated with the sulphur fames. Where there has been a disease like small-pox, or any infection which has shown great virulence, or which is actively transmissible, this mode of cleansing is to be advised. Chlorine gas has been used in the same way, but is no better, and is destructive of metals and colors.

The sulphurous acid fumes, although they will by long continuance effect vegetable colors, attack iron, and be absorbed by cloth, leather, etc., do not seriously injure these in so short a time, unless it might be some very unstable colors of cheap prints.

Chlorinated Soda, Chloride of Lime. As it is very frequently desirable to purify the air of a room, when the sick person, or a family, cannot remove from it, we have, in some of the preparations containing chlorine, articles of much utility for this purpose. It is said that the value of chlorine, as a disinfectant, came to be noticed first by the exemption from cholera of the Lancashire district, where the chlorides were used by the operatives for bleaching purposes. Its value is no longer questioned. It is most available for sanitary uses in two forms.

The *Liquer Sodæ Chlorinatæ, or solution of Chlorinated Soda,* is a liquid generally offered in the market under the name of Labarraque's Solution, from the Parisian apothecary who introduced it. It is convenient for washing or bathing, and if of proper strength is a quick and valuable disinfectant. This can only be known by purchasing it from reliable sources. Saucers containing two or three tablespoonfuls should be used until there is no other odor perceptible in the room, and should be replenished as indicated by this criterion. At present prices a pint bottle is worth twenty-five cents.

Chloride of Lime (*Calcic hydrochlorite*) is cheaper, and valuable for most disinfecting purposes. The lime itself has some value, but in this preparation is chiefly of service as a means of holding, and giving off, chlorine gas, which, being readily liberated, any organic matters are seized upon and changed as to their constituency. Commercial chloride of lime contains from thirty to thirty-five per cent. of chlorine ready to be thus liberated, under proper methods of use. Where it is to be produced in large quantities it should be tested, as it varies in its charge of chlorine, and so in its corrective or disinfecting value. But it is ess

variable than many other preparations, and as put up by reliable dealers in pound packages, at from six to eight cents per pound, is very available. In quantities it can be had at two cents per pound. It is a most excellent disinfectant, and, even in the sick room, can easily be borne in moderate quantity, unless there is special irritation of the breathing apparatus.

Two tablespoonfuls of the dry powder is placed in a saucer here and there, in the room, and just moistened with a little water and stirred with a penholder or small stick. If the atmosphere is already perceptibly bad it is best to moisten it with vinegar and stir briskly, and to add more of the dry powder when the odor lessens. There should be frequent stirring and replenishing of two or three teaspoonfuls each day, enough to keep a slight odor of chlorine perceptible in the room. If left unstirred it becomes encrusted with a carbonate of lime, and the air is not brought into contact with it sufficiently. The nurse soon comes to judge of the amount needed by the odor. When the saucers come to emit much smell of chlorine their contents should be thrown into any place where disinfectants might be of service. The chloride should not be kept in closets among china or steel ware, as it slowly tarnishes and corrodes these. It should also be kept, when not in use, in a dry place, or in a sealed fruit jar. Chloride of lime, either alone or mixed with recently-slacked lime, may, with advantage, be scattered about drains or any places where there are foul smells. In common use the indication of amount can only be measured by frequent repetition, until there is a cessation of the foul odors.

Oxide of calcium or quick lime is that prepared in lime-kilns. When broken in small pieces or recently slaked in its usual preparation for land, or for mortar, or for lime-wash, it is valuable as a disinfectant, both as an absorbent and as neutralizing some of the gases of decay. It may be used in all cases where there is exposed filth, and where a powder can be scattered upon it. It should be freely strewn about, day by day, until all odor is corrected. Since, in large masses of filth, it may hasten the escape of gases faster than it neutralizes them, powdered charcoal or an equal amount of common plaster may be added.

The popular "Calx powder" is made by powdering one bushel of dry, fresh charcoal and two bushels of stone lime and mixing them. Common lime and crushed charcoal may be thus mixed

but are not quite as effective. Ivory black or animal charcoal made from bones, and thus pulverized, presents with the same weight a larger surface than wood-charcoal, and is a more active absorbent.

The value of this and other absorbents is in the fact that they can take up many times their volume of gaseous products.

If, for instance, fresh powdered charcoal is mingled with a liquid or semi-liquid decomposing matter, the gases of decay will be condensed in its pores and rendered inactive until changed. If, instead of being mingled, the charcoal is placed over the mass so that escaping gases have to come in contact with it, a septum is furnished between the decaying mass and ourselves. As it does not act chemically, and we cannot measure the amount of gases emanating from the mass, one chief test must be the removal of odor. Gypsum, or plaster of Paris, dry coal ashes, dried peat, lime and well-dried earth have similar qualities. Not only as absorbing the foul gases, but as absorbing moisture they suspend or take away one of the conditions of putrefaction. It is important to secure for any thing that is foul, air deprived of moisture. There are many house-disinfectants, such as dry, sifted ashes, soot, charcoal and dried earth, which are quite available and well suited for drains, cess pools and out-houses and for all that kind of disinfection which seeks the entire removal of odor.

CARBOLIC ACID.

We do not give as great prominence to the use of carbolic acid as is generally given to it in the catalogue of disinfectants.

To it, undoubtedly, attaches the value of the creosote and coal-tar series, but its value is most difficult of adjustment.

As usually in the market, it is an indefinite mixture of phenol compounds of varied strength and potency. It is difficult to know what proportion is water, as the scent of a small quantity of these crude compounds is exceedingly persistent. The percentage of crystallizable acid is only known when it is ordered in quantities by sanitary officers under test. The public are not likely to get a uniform dilution.

Dr. Endemann, the chemist of the Board of Health, who is still an advocate for its use as an ingredient of disinfecting

fluids for general purposes, in the last report of the New York City Board of Health, speaks of it thus:

"Our ordinary methods of disinfection seem to be fully equal to the demand, yet there are customs which I consider entirely unwarranted, if we compare them with the results of the experiments described. I refer here to the use of carbolic acid for the impregnation of the air in sick rooms. If we should evaporate carbolic acid in the air to such an extent as would be required, the smell would be so strong that no human being could endure it for any length of time. It may therefore be asked why I have not recommended a discontinuance of the system. In answer to this I will state that I consider this homœophathic application of carbolic acid of practical value in so far as its smell, better than posted notices, warns strangers of the danger to which they expose themselves by remaining in an infected atmosphere." Again, he says, "from my statistics of the last six years, I have come to the conclusion that * * * the action of carbolic acid and its preparations has been more than doubtful, unless they were applied in such strength or quantity as is within the limits of the experiments I have cited. This can, however, but rarely be done, on account of the disagreeable and very lasting smell of this substance."

With such views we can hardly see how this chemist can advise a pint of fluid carbolic acid to five gallons of water, or a weak solution of forty to one hundred parts of water to one of fluid carbolic acid for out-of-door use merely "to warn strangers of an infected atmosphere," since it conveys an assurance of false security to those not strangers. If we could be assured of the quality of carbolic acid, a study of the experiments and experience of other authorities leads us to give to it, in common with other coal-tar compounds, some credit as a disinfectant. If it can be had, as prepared by Squibb, of certified strength, it is available, although not so good as some of the articles heretofore mentioned. The boiling of tar in any room where an infective disease exists, is of some service, and secures some of the benefit of the phenol compounds.

Dead oil or heavy oil of coal tar has been extensively used for the same purpose as carbolic acid, because it is cheap. It has in it carbolic acid, naptha, benzine and the heavy oil of coal-tar, all of which have some antiseptic value. There is now a process

by which the carbolic acid is extracted. For this and other reasons it is of uncertain strength, and should not be purchased by citizens without testing.

Thus far we have desired to confine attention mostly to articles which may need to be used for an infected room or house, or for the immediate vicinage. Next we note *disinfection of the person.* When there is need to use some disinfectant wash for the sick person, two tablespoonfuls of the chlorinated soda, before referred to, in a pint of warm water, is very good. A tablespoonful of chloride of lime in a pint of water, although not so agreeable, will answer the same purpose. A tablespoonful of borax in powder thus dissolved is also cleansing.

Permanganate of potash, which comes in purple crystals and keeps without change, is one of the best disinfectants for the person. It is most convenient for physicians, undertakers, etc., to carry with them for ready use.

A few grains are quickly dissolved in water in the proportion of a drachm to a quart. It is a very rapid oxidizer, of all kinds of organic decay, is odorless, and although colored, does not, in such dilution, cause any stain. An ounce of sulphate of zinc (white vitriol) to a quart of water answers also the same purpose.

DISINFECTION OF SECRETIONS OR DISCHARGES.

It has been quite positively shown that the infective power of cholera, typhoid fever, or other communicable diseases, resides in the discharges, or results from changes taking place in them a few hours after voidance. In scarlet fever, diphtheria, and whooping cough, there is reason to think that the scarf skin, the membrane and the sputa convey infection. It is always wise in sickness to take good care at once of all that separates itself from the patient. There is a sense in which it is correct to say that the person sick and his surroundings are not infective, if only the tidiest care be taken of all the products of the sickness. A breath saturated with antiseptics, a skin impregnated or anointed with deodorents and every excretion cared for limit the possibilities of disease, and make a sick room healthy to a degree not to be substituted by any other methods. It is a safe rule in all sickness to take early care of all discharges of any kind, to receive them into vessels containing a sure disinfectant, or

to at once add it thereto until such time as the discharges can be disposed of. Spittoons and all vessels should be thus cared for. Either one ounce of sulphate of zinc (white vitriol,) or one ounce of sulphate of copper (blue vitriol,) or one half pound of sulphate of iron (green vitriol,) or one ounce of chloride of lime may be put to a quart of water, and either of these used in a quantity about equal to the discharges they are to neutralize.

One half of a fluid ounce of chloride of zinc (butter of zinc, Burnett's solution,) in a quart of water is of similar service. All discharges should be disposed of within a few hours. They should not be thrown in exposed places or in a water closet in common use, if the sickness is of any infectious character. When buried in earth large quantities should not be put in one place, nor the burial be too deep, since the design is to place them where oxidation by the air can take place without too rapid escape of odor, and yet not be so entirely suspended as to collect a mass for future rapid change. If much in quantity any of these disinfecting liquids may be poured on the ground above them or dry absorbents be used. Next in importance is

THE DISINFECTION OF CLOTHING.

As to the bedding and linen used, and the garments worn, by reason of closeness of contact there is often saturation with unhealthy air or secretions. The best disinfection of clothing is by dry heat. In some cities and in many hospitals, hot air chambers have been erected in which infected clothing is hung or spread, and subjected to a heat of about 250° Fah. In Dublin there is a furnace of this kind for refreshing the woolen or outside clothing of the working classes, which, from being long worn without washing, often becomes greatly soiled. We have already referred to similar fumigation by sulphur at less heat. Some good is accomplished if clothing is kept for some time in a hot oven, and so subjected to dry heat, or hung up in smoke houses over a tar or wood fire. When soiled clothing is placed in water, by the soaking, any particles are rendered less transportable and if covered with the water the exclusion from the air is something. But this is not a process destructive of the particles. Such clothing should be boiled before washing. Thus

the heat of water or steam serves much the same purpose as dry heat.

Sometimes it is not convenient to use these means at once. In such cases it is best to place the garments in water to which some disinfectant has been added. Often, too, it is well to add some of these to the water in which the clothes are to be boiled. The Board of Health, of New York City, has recommended that clothing, until ready for boiling or washing, be immersed in water to which there has been added two ounces of sulphate of zinc, or one ounce of carbolic acid to each gallon of water; or a half-pound of sulphate of zinc, alone, may be used to three gallons of water. It will not stain or discolor fabrics. One ounce of chloride of lead, dissolved in a pint of hot water, and then a pailful of water added, into which a handful of common salt has been thrown, serves a similar purpose.

Permanganate of potash, the colored crystals already alluded to, is valuable as a disinfectant of clothing. Condy's Fluid, so well known as a disinfectant, is a mixture of permanganate of potash and soda, although varying often in the proportion of the different permanganates. The permanganate may be used in the proportion of a dram to a quart of water. It has this advantage that, by the color, you can nearly test whether the organic or soiling material contained in the garments you are soaking is neutralized. The solution is to be repeatedly added to the water, with short intervals, so long as it becomes colorless by standing. When a slight discoloration of the water is maintained we know that enough has been used. The clothing may be boiled in the fluid. Parkes recommends two ounces of commercial chloride of lime, one ounce of sulphate of zinc (white vitriol), or one-half of a fluid ounce of chloride of zinc (butter of zinc) to be added to each gallon of the boiling water in which the garments are thrown. As some of these articles are poisons when taken into the stomach, although from their taste not apt to be touched, they should be kept from the reach of children.

The chlorinated soda solution before spoken of is also excellent as an addition to water for purifying clothing. A half pint of Squibb's carbolic acid solution, for common use, added to three gallons of water will do where the odor, which is dissipated in drying, is not objected to.

When any carbolic acid solution is used alone for soaking or in washing clothing it must not be stronger than one part of the fluid acid to sixty parts of water, and as much of vinegar as of the acid should be added that drops of the oil may not injure clothing. The clothing should also be rinsed out in water having washing soda in it. With these precautions it may be used. Articles that cannot be washed and have been well beaten or shaken and aired, may, in some malignant diseases, be still further freshened by sprinkling upon them the sulphate of zinc solution.

DISINFECTION OF HOUSEHOLD ACCUMULATIONS OUTSIDE OF THE HOUSE.

For these the general rule is somewhere outside to have an opening between the sewer and the house by which fresh air can gain access. This opening should not be too near the building, or at least should be so constructed that disinfectants, if necessary, should be so used that any unpleasant odor is quickly neutralized.

Sulphate of iron (copperas) in the proportion of one pound to a gallon of water is among the most valuable and available disinfectants. It may be poured into pans or closets to the amount of a pint twice a day at the cost of one cent, or sprinkled over masses of decomposing matter or filth-sodden ground, until it oxidizes all that might escape to the detriment of health. As the carbolic acid is of some service and the out of door odor not afflictive, a pint of the crude acid of Squibbs stirred into ten gallons of water with the copperas increases its disinfecting properties.

When masses of offal or compost have to be overhauled or removed, the mingling of dry earth, lime, plaster, charcoal or ashes, takes up or neutralizes many of the gases of decay and so counteracts odor and adds to the fertilizing value of the mass.

While it is not always certain that secretions or masses of matter not unpleasant to the senses, are harmless, it is nevertheless true that the nose is a licensed detective, and that repeated use of a disinfectant without odor of its own, until the unpleasant odor of the mass ceases, is an available and reliable guide in most cases.

What is known as Sirel's Compound is easily and very cheaply made and of much service. This is it:

Sulphate of iron (copperas) 40 lbs.

Sulphate of lime (gypsum or plaster of Paris) 50 lbs.

Sulphate of zinc (white vitriol) 7 lbs.

Powdered bone charcoal, 2 lbs. (If common charcoal, 6 lbs.)

It may be scattered over or into decomposing matter or slightly wet and made into balls and so kept ready for use or stirred in water in the proportion of a pound to a gallon of water.

What is known as the "lime and salt mixture," is not only valuable, agriculturally, as an addition to composts but has valuable disinfectant and deodorent properties. It is prepared by adding one bushel of salt to three bushels of fresh slaked lime, and frequently stirring the mixture under cover until it absorbs sufficient moisture to be slightly adherent when dry earth may be mixed with it to a small amount, and the whole scattered when needed.

Another mode of preparing it is to pour a saturated solution of salt water upon unslaked lime in the proportion of one bushel of salt to three of lime. Stir it every day for a week under cover. In this process the chlorine of the salt unites with the lime, and a chloride of lime is formed. This is a ready and valuable mode of preparation. The compound may be freely scattered in cellars or about outbuildings. It is inexpensive, and when thrown on heaps of compost has a fertilizing value which pays for it.

There are other articles which act as disinfectants, but the list already given affords sufficient variety and presents those which are cheapest and most efficient. There is little need to resort to any of the patented preparations since the real efficiency of these is not easily tested.

A good disinfectant either has in it oxygen, which it readily gives up to organic matter undergoing decomposition, and so renders it harmless, as do the various metallic substances we have named, or like charcoal, dry earth, etc., can act as an absorbent of the gases of decay, or like lime, while hastening the processes of decomposition, when in immediate contact, also breaks up ammoniacal products, or disposes of them. As some of these

articles act doubly we cannot accurately classify them, but thus associate them as in one way or another dealing with decomposition and its products, so as to render them less perilous to health. From the variety given anyone, either for home or public use, may easily select a good disinfectant. Chlorine, carbolic acid and the permanganate salts, if used together, interfere with each other. As to several of the articles we have named there are differences of preference which are more those of taste and habit than difference in their value. We believe that with the proper use of air, water and cleanliness, and resort to these when indicated, very much sickness can be prevented, and the risk from infectious diseases and bad air greatly diminished.

Herewith, for permanency of reference, we append the circular which the Board of Health issued last July, on the care and disinfection of houses, cities, &c., as embodying the principal facts and directions needed for guidance in the use of the various articles we have considered.

CIRCULAR

OF

NEW JERSEY STATE BOARD OF HEALTH

TO HOUSEHOLDERS, CITY AUTHORITIES, BOARDS OF HEALTH, ETC.

I. *Look to the Condition of your House.*—Begin at the cellar or basement. Have nothing there that can decay, or that causes foul odors. If damp, let in air or sunlight, or drain the surroundings if needed. If by cleansing, by whitewash or by repeated airing there is not agreeable air, speedily use some of the disinfectants recommended.

II. *Look to the Kitchen.*—Let all sinks be kept sweet by scrubbing—by hot water poured down each day, or by use of disinfectants if needed. If outside there is an opening to the air, so that the kitchen sink is not the chief air outlet to a cesspool or sewer, so much the better. Be careful that all slops or offaling from the kitchen or laundry work is soon conveyed away, or disinfected at once, and not made to become a part of any heap or mass of impure matter. Cleanness cannot come out of uncleanness. Such things rapidly vitiate air, and discomfort, sickness or death result. Dirty water of any kind is even worse than dry filth. Secure cleanliness if you would secure health.

III. *Have the Dwelling and Sleeping Rooms well aired each day.*—Closed closets, unshaken bed clothing, windows open and curtains down, will not secure rooms fit to live in, or sleep in. *Flush* the room with air and let this, with sweeping and dusting, remove the organic particles which otherwise constantly accumulate and cause foulness. Chamber slops and wash water are very innocent if cared for within six hours, but soon after decompose, and in sickness or very hot weather, sometimes sooner. If there are water closets or stationary wash basins in your house, be sure

that they are not the foul air inlets to outside cesspools or sewers. Have good traps, good outside ventilation, good caution as to smells and use disinfectants for temporary purposes until you can remedy radical defects. Look to unoccupied rooms and the attic so that all may be dried and well aired, and that you may secure as much coolness and ventilation above you as possible, and not have an unventilated hot air chamber near the roof.

IV. *Know as far as you can that your Water and Ice Supply is Pure.*—Use no water from wells where surface soil is foul or where organic matter can reach, or from cisterns exposed to foul air, as water will absorb foulness. If the water has any odor while heating in a glass tube, or if it becomes turbid or emits odor on being shaken after being kept a day in a long glass bottle, half full and corked, at once suspect it. If you must use it, have it boiled, and when cool, air it by pouring from one pitcher to another, and use it thus until you can be satisfied as to the purity.—See in full our First Annual Report, pages 83-4.

V. *See that the Food Supplied for your Family* is in proper condition before cooking, and that it is prepared in a wholesome way.

VI. *Look to the Out Door Part of your Home and see that it is kept in Proper Order—that no waste water or decomposing matters are thrown upon it.*

If there is a cesspool it must not smell where it is disconnected with the house or has access to the air. If it does, it must be disinfected until radical change can be made. If there is an ordinary out door privy have free access of air to it, and exclusion of all slop or rain water from it. If there is odor from it use odorless disinfectants until it is corrected. If too foul for use cover it over with "calx powder," and have under the seats some receptacle, such as the patent pail, or a half barrel or tub, which can be frequently removed and alternately replaced by another. A privy built above ground, with water-tight receptacle, by the use of dry earth, powdered wood charcoal, dry sifted ashes and occasional copperas water, is easily kept neat and clean, if cleansed each spring and fall.

Country homes need inspection and circumspection. Their sanitary care is often greatly neglected by nice people.

VII. *Insist that your town, if you live in one, have thorough sanitary inspection.* Where persons are housed closely to each other there cannot but be evils from which the community has a right to be protected, and yet from which each one cannot protect himself. There will be householders who, from thoughtlessness, ignorance or poverty, do not secure for themselves or for others the needed sanitary conditions. Charity, the public welfare, and the necessary incidents of city life require regulated and definite provisions against all those nuisances which imperil the life and health of the populace.

Insist upon systematic prevention, instead of waiting for that loss which disease always involves when it is artificial or when we are compelled to meet an epidemic hurriedly.

If your authorities do not act, move by voluntary associations, which shall exhibit the facts and so compel action.

There is no waste so great as that of preventible disease, which disables not only the sufferers, but puts a tax on labor, capital and life much more direful than a well directed expenditure to prevent it. Epidemics are to be dreaded, but our greatest losses are from a chronic death and sickness rate which has a permanent base of supply in prevalent unsanitary conditions, not prevented, not remedied as they should be and can be. Public health is common wealth. Can you not do something to reduce the tax levy which forced diseases impose upon the citizens of your city, township and State? To the degree that sickness or invalidism is unnecessary, it means hard times and ill-content. Every motive of comfort and interest requires that we plan to prevent all those ailments which are within the range and duty of our control.

DISINFECTANTS, AND HOW TO USE THEM.

Drafts of air for all floating foulness;

Dry rubbing for all easily detached foulness;

Wiping and water scrubbing for all attached foulness in most cases admit of no effective substitution.

Submersion in boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method; and dry boiling heat or freezing cold will also neutralize infective particles.

To disinfect a room, ship or building so needing disinfection that its contents and surfaces cannot be easily dealt with singly: Close the room or building, its windows, doors and chimneys so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it in each room on an iron plate or metallic dish, and set this on a pair of tongs or other cross bar over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. A pound and a half of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of the air into sulphurous acid, and all organic particles are likely to be changed. Keep closed six hours after the burning has ceased, and then air well four hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterward.

CHLORIDE OF LIME.

A valuable disinfectant, chiefly because it contains from thirty to thirty-five per cent. of chloride, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. It is not overrated as a disinfectant if only its quality is known and its mode of use is judicious.

It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

CHLORINATED SODA.

Usually known as Labarraque's solution, is a convenient liquid preparation valuable for use in saucers in the sick room or in utensils. Its odor should be perceptible to strangers entering. Directions are given on the bottle.

LIME—PLASTER—CHARCOAL—DRY EARTH—SIFTED ASHES.

All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered

in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry fresh charcoal and two bushels of stone lime and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it

Quick lime and ground plaster should not be used where they may be washed into pipes and form lime soap or obstruct by hardening.

THE METALLIC DISINFECTANTS.

Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, to be sprinkled freely in drains, cess pools, privy closets, soiled vessels or on heaps of decaying matter, which cannot be removed at once. One-half of the strength will do where it is to stand in contact with surfaces or in spittoons, water closets, house-vessels or vaults.

One-half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect.

Soiled garments may be put to soak in a half pound of sulphate of zinc (white vitriol), to three gallons of water. It will not stain or discolor most fabrics. One ounce of chloride of lead dissolved in a pint of hot water and then a pailful of water added into which a handful of common salt has been thrown, serves a similar purpose. Also a half ounce of permanganate of potash to a gallon of water.

For washing, soiled garments should be put in boiling water, unless the character of the fabric forbids it. Powdered borax one quarter of a pound to a gallon of water, is a good cleanser of clothing. Soiled hair, brushes, etc., are cleansed by it. Chloride of zinc, one quarter of a pound to a gallon of water, does not stain or discolor fabrics.

Parkes recommends two ounces of chloride of lime, or one ounce of sulphate of zinc, or one-half of a fluid ounce of chloride of zinc, to be added to each gallon of the boiling water in which the garments are thrown. On clothing that cannot be washed and does not need to be burned, after thorough shaking and airing the sulphate of zinc or chloride of zinc solution may be sprinkled.

For general disinfection the following compound is available and valuable, and far better than most of the patented articles offered :

Sulphate of iron (copperas), forty pounds.

Sulphate of lime (gypsum or plaster), fifty pounds.

Sulphate of zinc (white vitriol), seven pounds.

Powdered charcoal, two pounds. (If common charcoal, six pounds.)

Mix well and scatter dry or wet it in small quantities and make into balls ready for use. Where liquid is needed, stir in water in the proportion of a pound of the powder or ball to a gallon of water, and sprinkle where needed.

Carbolic Acid is valuable as an out-door disinfectant, to be added to the sulphate of iron solution or used separately. Because of its own odor we cannot well test its effect in correcting other smells. We would test specimens or use only Squibb's Liquid, No. 1, because sure of its strength to be diluted by adding from fifty to one hundred parts of water, according to the mode of its employment. It is seldom required if the other articles named are properly used. Carbolic acid and chloride of lime must not be used together.

Remember that we do not know that any chemical disinfectants destroy the germs of a disease.

They only neutralize or suspend the action of those artificial disease producers or fertilizers which the bad administration of cities or householders, or interference with natural laws or neglect of cleanliness has provided. We are to rely on these palliatives or correctives only while we are preparing for radical methods of prevention.

N. B.—The only reason why the death rate of your city or your township is over 15 to the 1000, or why the sickness and

valid rate is a large multiple of this, is because you are the victims of nuisances which admit of abatement.

PRESENT WHOLESALE PRICES OF DISINFECTANTS.

Sulphate of Iron (copperas, Green Vitriol), 1½ cents per pound.
Sulphate of Copper (Blue Vitriol), 6 cents per pound.
Sulphate of Zinc (White Vitriol), 4½ cents.
Chloride of Lime (in bulk), 2 cents per pound; in packages cents.
Sulphur Roll, 2½ cents per pound.
Carbolic Acid (No. 1 Squibbs), 30 cents per pound.
Zinc and Carbolic Acid, disinfectant of N. Y. Board of Health cents per gallon.
Permanganate Crystals, $1.10 per pound.
50 per cent. solution Chloride of Zinc, 25 cents per pound.
Solution of Chlorinated Soda (Labarraque's), 10 cents a pound.

METEOROLOGY AS AN AID TO THE PHYSICIAN.

BY PROF. C. F. BRACKETT.

There can be no doubt as to the value of a system of knowledge which should enable us to forecast the weather for a considerable time. The gain to those pursuing agriculture and other industries on land would be incalculable, while the safety of the mariner would practically be measured by his intelligence and care.

The very maintenance of life itself is in the nature of a contest, to which the ever-changing processes of nature, which constitute what we call climate on the one hand, and the more circumscribed, but not less complex, activities of the organism on the other, are parties. The successful issue of such a contest must turn on the skill with which it is conducted. It may be readily admitted that there is a vast amount of experience in the race which has not been formulated in language—which, indeed, no words could embody—common alike to men and animals, which enables a goodly number to win; and yet, it must be confessed that the failure of the vast hosts that fall out by the way, is a subject for very serious study.

Life having to do with surroundings whose elements are, in general, earth, water and air, it must be greatly to our advantage to be able, from the past and present, to infer the future. And as the value of such ability is to the mariner greater, when exposed to greater dangers from scantiness of food or fuel, so to the invalid it increases in importance when the necessity of extreme care and economy are upon him in respect to health.

The physician, as his guide, should be able to offer him all the aid attainable in anticipating and accommodating himself to the external conditions as they may arise, as well as to prescribe proper diet and medicines. In short, no treatment can be rational and judicious which ignores climate and climatic

changes. No doubt the great father of medicine wrote more wisely than even he knew when he said, "Whoever wishes to investigate medicine properly should proceed thus: In the first place to consider the seasons of the year and what effect each of them produces. * * * Then the winds, the hot and the cold, especially, such as are common to all countries; and then such as are peculiar to each locality." Then, after speaking of water and surface features, he goes on to say, "From these things he must proceed to investigate everything else. For if one knows all these things well, or, at least, most of them, he cannot miss knowing, when he comes into a strange city, either the diseases peculiar to the place, or the particular nature of common diseases, * * * and, if it should be thought that these things belong rather to meteorology, it will be admitted, on second thoughts, that astronomy (used for meteorology) conduces not a little, but a very great deal, indeed, to medicine."

If such views prevailed in the days of Hippocrates, they are with reason even more important now, when the real significance of physical phenomena may be ascertained with far greater certainty than was possible in his time.

If it be the proper business of the physician to conduct his fellow-man in the ways of health, as well as to bring him back when once he has lost them, he, surely, must not be wandering in doubt himself. He must know man not merely as a machine, but must rightly apprehend the relations existing between all that goes to make up man and his surroundings. He can be content with nothing less if he would vindicate his claim to his somewhat exalted title.

In respect to soils and waters the attainment of such knowledge is not so inherently difficult, for they may be taken, and, by proper analysis, be made to disclose their sources and their injurious elements, and so they may be avoided, while it still remains true that "the wind bloweth where it listeth."

It is the object of this paper to point out some of the difficulties pertaining to the study of meteorology, as well as some of the results already attained, having specially in view the bearing of the whole on the proper work of the medical practitioner.

Meteorology properly embraces the study of atmospheric phenomena resulting in connection with the physical properties and configurations of the earth in what we call climate and weather.

The atmosphere presents a pretty uniform mixture of elementary and compound gases and vapors, whose proportions are, on the whole, very constant, and are known with considerable accuracy. Many careful analyses have shown that nitrogen constitutes about 79.2 and oxygen about 20.8 parts of its volume. In addition, other constituents are vapor of water in variable proportions—carbonic dioxide, ammonia, ozone, compounds of nitrogen and oxygen—organic matters due to decomposition, traces of volatile matters derived from many solid substances.

It may, perhaps, aid us in our task if we imagine the atmosphere free from storms and winds, so as to be quite at rest, so far as can be observed by its mechanical effects, and at the same time the earth to present no irregularities of surface. There would still remain the weight of the atmosphere, to which every being on the earth must be subject. If the air were of uniform density throughout, its height would be about five miles. If it were compressed so as to be as dense as water, its height would be about thirty-three feet. If it were further compressed, till its density equalled that of mercury, it would be only about thirty inches. We should best realize the weight of the atmosphere, perhaps, by computing that of an ocean of mercury enclosing the earth, thirty inches in depth.

Under the conditions supposed there would be no respite from the steady, unvarying pressure which we may well believe would speedily bring all life, as we now know it, to an end. But suppose it otherwise, and that life could exist and prosper, would it be true that the air would be completely inactive?

The dynamical theory of gases now doubtless satisfactorily established, affirms that every individual molecule of gas is in a state of most violent and unceasing activity, the mean velocity of the molecule being in the case of oxygen, about one-quarter of a mile in a second; that of nitrogen being somewhat greater. In consequence of this activity, it is clear that we might expect great uniformity of mixture in the atmosphere, even if the mass of it were apparently at rest.

Let, now, the earth's surface assume its present configuration. Plainly some variety in respect to pressure might be secured by choice of residence, those in the valleys having the greater, and those on the heights the less.

The practitioner, in such a world, would, no doubt, wisely send his patient dwelling in the lowlands, suffering from pulmonary insufficiency, up among the mountains, and so apply his knowledge of the laws of fluid pressure to effect a cure.

Under the conditions supposed it is clear that our chief reliance for an unvitiated atmosphere must be on the diffusive action of its constituent gases, resulting from their great activities. Slow oxidation, no doubt, would proceed as now, only much more slowly. In short, we should have on a grand scale the same conditions as prevail at present wherever the air is restricted in its circulation, whether from natural or artificial causes, at least so far as the question of purification is concerned.

Let us now consider some of the causes, external to the earth, which are continually acting so as to render the state of things just supposed, impossible, by setting up movements of most tremendous energy and extent. The principal of these is the sun, our great source of heat and light.

If we have recourse to our former suppositions, imagining the earth free from all irregularities of surface, it might, perhaps, seem possible, from what we know of the laws governing the motions of solids and fluids, to calculate, from data which observation might secure, the principal phenomena which would present, day by day, and thus we might be able to predict those changes in the weather which it so much concerns us to know, provided we might assume the sun to be constant in his action.

But we know that his action is not constant, hence, before we could go on with the solution of our problem, we must investigate the laws of solar activity. We may consider as known all those changes of our earth's position, with respect to the sun which astronomy has pointed out and made familiar. Something, too, is known respecting periods of maximum and minimum activity of the solar surface, but a vast deal remains yet unknown, and we shall require the continued and regular employment of every appliance that can qualitively detect or quantitatively measure the intensity not only of activities which are now known to exist, but also of those which further inquiry is sure to disclose. The camera has but just commenced its important work, it would seem, for new processes in photography are just coming forward of sensitiveness heretofore un-

imagined, while it is still true that the older and well-known methods have never been worked to any extent proportionate to their capabilities. The spectroscope, the heliometer, the magnet and the telescope even have much more to say than they have uttered thus far, while new and undreamed-of instruments will be needed in the immediate future to prosecute inquiries already proposed.

But even if we had catalogued and measured the solar activities in all their varying intensities, there would still remain the grand integrals of stellar influences which we might not neglect, though placed so far remote.

Suppose all these studies completed. We should thus know the agents which, acting in conjunction with terrestrial conditions, produce those effects which constitute the climates we would know and the weather we would foresee.

Let us now enumerate some of the factors entering into the problem which result from the configuration of the earth's surface. These are the complex continental and oceanic outlines, the interspersion of islands in the seas and of lakes in the lands; the disposing of mountain chains to interrupt or change the direction of wind and to condense the moisture they bear; the courses of the valleys determining those of the rivers; similar features of the ocean bed determining the extent and direction of ocean currents; the character of the soil in respect to radiation and absorption of heat; the nature and extent of vegetation, etc.

Now, after fixing the exact boundaries and relations of all these features, we might suppose ourselves ready to proceed; but we should find that, meantime, the whole had been undergoing changes such as vitiate our record, even supposing that its original complexity did not defy our utmost resources of expression.

If it were otherwise, and we had at last come to the final effort of deducing the future from the present and past, we should have now no problem in statics, but, instead, an exceedingly difficult one in dynamics. We must study a tremendous engine in action, in which the regular cycles of our theoretical engines are absent, or at least not readily apparent. From every stroke there results a new condition, making it difficult to say what the next shall be. It would seem, in view of what has now been

presented, that the time for the deductive treatment of weather problems has not yet arrived.

Let us now see how the case stands, viewed from another point:

All the world knows that in spite of the discouraging picture above presented, weather-charts and storm-warnings, often of surprising accuracy, are sent out from governmental centres at home and abroad, and are in daily use in arranging plans for business or pleasure by thousands.

The telegraph, as a means of rapidly collecting facts respecting atmospheric conditions from widely distant points, has rendered this possible. A country of great extent like ours is evidently favorable to success in such an undertaking, yet we are very far from having realized all that is possible.

The discussion of data daily collected and the comparison of the results with the subsequent history of storms have overthrown many views that were formerly believed to be too obvious to admit of doubt, and have established some generalizations that were recently in doubt.

On the whole, however, there is progress which we may expect to be more rapid in the future, since now hardly a civilized people exists that does not recognize the immense importance of such studies and contribute to further them by an active co-operation.

When once the whole earth is encircled by telegraph lines by which observers stationed at important points all about it, shall report the facts they observe at the same physical instant, it will, perhaps, be easy to say not merely twenty-four hours in advance, but several days, what and how violent changes in the weather may next be expected.

Such results would approach very closely to a solution of our problem; but the process employed, let it be noted, is entirely different from that which we at first supposed to be employed.

It must still remain true, after all is done that may be to forecast the weather, that only general laws which govern movements of great extent can be detected.

The habits of local showers and the domestic fog-bank must be studied by the prophet of every neighborhood which presents any peculiarity of feature or position, as must also the higher clouds and prevailing winds, and, indeed, everything that can in

any way contribute to the end in view. Instrumental observations carefully and continuously made, may, in connection with the daily bulletins issued by the Signal Service, lead to previsions that shall seldom fail to be of substantial accuracy. But here let us insist that to be of real value, observations *must* be made in a continuous manner almost from hour to hour, whether we record the changes apparent in our instruments, or those going on the effects of which are visible in the clouds.

Respecting the proper choice of instruments and installing them in their places, it is not needful that anything here be said, since whatever is done should be so done as to conform to the uniform practice of those having the direction of an extensive service in charge, in order to uniformity of results under like conditions.

No one will wisely reject, without examination, the weather wisdom professed by those who lay no claim to scientific training, but whose acute observation and native shrewdness have enabled them to put their results into short pithy sayings, often apparently absurd, but still frequently verified. "In summer the showers follow the rivers," may serve for an example. The explanation is not far to seek. Many maxims of a similar character may be gathered in every region that has been long inhabited, and it is a curious and profitable study to unravel the reasons for many of them, as well as to show the unreliable character of others. It would be found that the unobserving stranger, who migrates to a new locality, brings the opinions respecting the weather, as well as respecting everything else, that prevailed in his former home, but which may not be at all applicable in the now changed conditions; hence, a vast amount of nonsense is everywhere to be found.

It would be quite superfluous to point out in detail the bearing of accurate weather provisions on the public health, for the advantages of such knowledge is so obvious that practitioners and patients alike have long desired it.

Indeed, the whole catalogue of means at the disposal of the physician may be arranged under the heads of circumfusa, ingesta and medicamenta, of which the last is by far of least importance. It would not always be the part of wisdom for an invalid to journey far and endure the consequent fatigue when he failed to take proper advantage of the climate at home. This

can be more certainly done, the more completely the character of the climate is studied.

The physician, then, should study the climate and the weather of the place in which he is to practice his art, as completely and as persistently as he studies the cases of his patients. Indeed they are not to be separated, for a sudden change that a day may bring, not unfrequently decides a case by closing it against all further inquiry.

If the attention of physicians could be drawn to this subject in such a manner that they should not only make it a matter of careful and constant study, but as a fraternity of learned men, should insist that a good knowledge of it should be required of all who seek admission to their ranks, we should have reason to hope for most excellent results in the immediate future. A careful training in the principles of chemistry is considered essential to the discipline and preparation of a physician, and rightly, but it must be admitted that such a knowledge of physics as shall enable him to observe properly the changes going on in the atmosphere, and to conduct researches likely to enable him to turn them to good account, is not less important.

Let all who would possess themselves of even the knowledge that is now to be secured, dismiss every hope that it is to be found by any such course of inquiry as that which we have shown, must, in the nature of the case, present insuperable difficulties. The only hopeful method is that which puts under contribution facts collected from the widest areas as well as those of merely local importance—and judiciously applies the best methods of discussion and interpretation.

Fortunately, there are now many helps to which one may refer with confidence.

PRINCETON, December, 1879.

LETTER

PRESENTED TO THE LEGISLATIVE COMMISSION ON THE GOVERNMENT OF TOWNS BY THE STATE BOARD OF HEALTH.

On behalf of the State Board of Health, by your kind invitation we beg to present to the honorable Commission on the Government of Towns a few suggestions as to the sanitary administration of municipalities, and how far this should come under the regulation of general or State law.

We do not at present need to discuss in extenso the importance of recognizing sanitary enactments as a vital and integral requisite for each State. You will recall that even the common law of Blackstone's period speaks of the "fourth species of offences more especially affecting the commonwealth, as such as are against the public health of the nation." "A concern," says he, "of the highest importance, for the preservation of which there are in many counties special magistrates or curators appointed."

While every county of the State is subject to some insanitary influences which need surveillance and abatement, experience has shown that it is in cities especially that we are apt to find that aggregation of evils which largely tells upon the health and life of the population. Statistics carefully tabulated have fully justified the statement of the Registrar-General of England that "human life is shorter by almost one-half in cities than in the country, so that with much truth great cities have been called the graves of mankind." This is really but a way of illustrating that disease and death in practical experience are largely artificial. In a general and casual knowledge of sickness and death, without comparative statements, we are not made aware how much the conditions of life are affected by this aggregation.

The death rate per thousand of living people fluctuates from thirteen to forty, fifty or sixty per one thousand in different places, the fluctuations being very largely chargeable to the local, the domestic, and the associate conditions of population. Large numbers of comparisons, extended through many years, have shown how uniformly the larger rates attach to cities, and especially to those in which there is no effective sanitary oversight.

Similar tabulations have also shown conclusively how in most cities a higher death rate than in the country is uniformly maintained, without the agency of special epidemics, and how this can be uniformly reduced by the intervention of sanitary enactment and enforcement.

In the thirty-eighth annual report (1875) of the vital statistics of England and Wales, may be found tables showing the annual rate of mortality per one thousand in town and country districts in the twenty-nine previous years. The contrast is most significant as to the tendency of cities to multiply disease far beyond the natural average. In the thirty-seventh report comparisons are made of thirteen districts as showing what sanitary administration can accomplish for massed populations. The result is thousands of saved lives, which it is also to be remembered represents still more advantage in the saved health and diminished sickness for the living which such figures always indicate.

It were well if statesmen and civilians would come more fully to realize the dependency of effective citizenship and State development upon a provident care of the public health. It is deceptive to talk of our *material resources* and forget that there is no resource so powerful or the case of which is so urgent as that of population. The time too has come when we need to deal more with the causes of enfeeblement, degradation and loss, and not so much confine our Legislation to compensation for consequences.

As dwellers in cities are so much more largely exposed to insanitary conditions New Jersey has especial need for wise foresight. Not only does modern civilization incline to mass the population in cities, but the peculiar relations of our State to adjacent cities and to tide water will ever incline our people to aggregation in great centres. Our fifty cities already represent in a very small comparative area the majority of our citizens. They must be studied as to the conditions of progress.

Protection from avoidable causes of sickness and death means provision for prosperity as much as do care and direction of our industries.

The rapid growth of towns, the influx of immigration, the insanitary condition always incident to the arrival of those of varied nationalities into close vicinage, the introduction of machinery and the consequent increase of close in-door labor in so many departments of industry, the modern system of in-dwelling conveniences, and various other potent and confirmed artificialties, compel us to guard more than did our fathers, against associate evils, and to remedy consequences already cumulative and apparent.

Sanitary provision as a law of compensation is so far demanded, that, *if not* made, a lowering of natural vigor, a larger aggregate of sickness and untimely death are the inevitable results.

Modern sanitary knowledge has become so much more definite and exact, both as a science and an administrative art, that it does not hesitate to point out evils with precision, and to indicate confirmed methods of limitation or abatement. Students of the conditions of physical life and those who are now, by thousands, engaged in the active practical application of sanitary knowledge, are constantly deploring how far short are the actual means used of the methods approved and available. Life, health and the welfare of population are within the reach and the duty of our control, if only the art of oversight is applied within the limits which strictly belong to the material interests of such a social compact as the State is.

The sanitarian runs no risk of discomfiture, if he takes his stand within the closest limits of social science and political economy, and pleads for legal jurisdiction solely on such grounds as pertain to the resources of the State and the social welfare of its citizens. Deliverances from the civic burdens and penalties of sickness, shortened life, and from the entailments of poverty, asylums and prisons are largely within such an estimate.

By a fundamental and organic law such an interest as this falls under legislative and judicial advisement to a degree which commends itself in theory, but yet which in practice has thus far been very inadequate.

In England the most definite early modern movement for sanitary jurisdiction was a direct outcome of social and economical interests. The report of "The Commission on the health of Towns," led to the bill of Lord Morpeth "for improving the health of towns in England," which became a law in 1848. When it was found that in some cities of England the death-rate was continuously over twice as great as in some country localities, and that large towns varied among themselves from twenty-one per thousand to thirty-eight per thousand, it was regarded as not only a local or town interest, but a national interest to look after the causes of such sustained variations in the health condition of localities. Ever since it has been found profitable by the English Government, as it has been by the French, the Swiss, the Swedish and the German, to follow up this method of public care until no department of national concern rests on a surer basis or meets with a more public approval than that of the health service. It is from such considerations that we desire to urge upon this Commission, for the government of towns the interest as one so vital to the whole State as in some leading outlines needing defined State provision. In the conferment of chartered rights, the State should see to it that the welfare of her great municipalities is not compromised and that city governments shall not imperil the welfare of our citizens.

As a result of a close analysis of English statistics and of towns as compared with the country the English report says: "The juxtaposition of the figures in the tables suggests the melancholy reflection that more than seven millions of people inhabiting the metropolis, and all the cities and great centres of industry, are exposed to a mortality which is not inherent in their nature, but is due to the artificial circumstances in which they are placed. The waters, the sewers, the soils, the churchyards, the houses, emit poisons. To every ten natural deaths, four violent deaths i. e. deaths from these poisonous exhalations are superadded." The same kinds of ratio are still occurring, and are to be guarded against by the State in its authorizations of massed communities with vested privileges. We might almost rely upon the admission which this view has received abroad, and quote in detail the uniform and progressive interest which has been manifested, as shown by the degree to which

local legislation has itself sought or approved of general enactments.

But as in our system of government more is left to local authorities than is usual in those of a more consolidated character, we need to determine whether this belongs to the large class of interests which, not less than in other nationalities, should be conceded to belong to the State government.

Even here we may at first urge the large example of Massachusetts and Michigan in their general health enactments, and still more the recent act of the National Government, in which after a debate neither partisan nor sectional, a large majority from different constituencies has been commanded in favor of the recognition of public health, as in prominent respects so much a national concern as not to be left to local jurisdiction, even of States alone. It is thus authenticated as a constitutional principle that the interests of public health are so imminent and vital that the general government must, by general act, see to it that it either exercise its national jurisdiction or require that the same shall be exercised by local authorities.

When we come to deal with the still more intimate and common interests of the citizens of one State, it is still more apparent that closer vicinage and harmony of interests require that the public health should be carefully secured by general enactment in all those regards in which the danger of jeopardy to the bodily and social welfare of our people, is greater than any assumed risk which might arise from hypothetical infringement upon the prerogative of towns by the exercise of the higher authority of the State.

Questions of health and physical welfare are in many points allied to those of education. General and regulative laws must be enacted by the State while the enforcement and the extension to details may rightly be left to each city.

Unless there are some such general enactments, it has been a uniform experience that strange neglects occur. While some corporations are informed and faithful, others, by their laxity, involve not only their own municipality, but their neighbors, in the results of their indifference or ignorance. Where peril from such neglect is so universal and so aggressive in its results to the State, and where from the fact of a want of co-ordination of action in the whole, there is necessary defect in the action of

a part, it behooves the State to exercise its regulative and co-ordinating power. These interests are so vital to all citizens that they cannot be left to smaller communities alone. They are too far-reaching to be disposed of as if they were merely local matters.

The State, in the formation of a municipality, accords to it not a few special privileges, and confines to it large rights of local jurisdiction. In such bestowal of powers it is not too much for the State to reserve to itself the right to secure for its own citizens such over-sight of the health and life as is the equal right of all, or the care of which, in some definite form, must at least be enforced upon the local authorities.

We may not leave such a universal social interest any more than we may leave the principle of education or of law, to be entirely subject to the enactment or oversight of local powers. Often where it is unwise for general law or State authority itself to undertake the administration, it is wise to designate what is due to be enforced by local authorities in a common interest, and to see to it that local power is dispensed in accord therewith.

With these views as thus presented, we beg now to designate particulars in which our Board would respectfully suggest to your honorable commission that there is need on the part of the State of general health requisition for towns.

1. We submit that every incorporation should be required to have a Board of Health, which shall make a written report each year, or as much oftener as any city may direct, and that copies of the annual report shall be sent to the State Board of Health. The interests of each city and of the whole State are so related that no just estimate of localities, of their defects and of the relative healthfulness and peculiar local causes of disease can be fully made unless there is a comparison of one part with another. While the whole area is important, this comparison naturally begins with cities as representing our most exposed population. The State, by its Board of Health, seeks to bring together series of facts and to make such deductions as can only be made by comparisons, and such as have been found greatly to aid local administration. A Board of Health, therefore, not merely nominal, but one which, by its reports, shall show what is being done to protect the health of the citizens of New Jersey needs accurate statements from all our cities, and such

uniformity as to general health regulations as are requisite to the welfare of the whole State.

2. We submit that all cities of over ten thousand inhabitants should by law be provided with one or more sanitary inspectors. The experience of all English cities, and especially of cities of our own country, has shown that the evils of close city life are such as to need that kind of watchfulness afforded by inspection as a system. When this is left to a police force it is recognized as a duty entirely different from that for which a police force is created, and it comes in as so incidental and special as never to be well reached in large cities by this plan. Sanitary inspection is of itself a distinct service. It requires some special knowledge of proper health conditions, a careful inquiry into departures therefrom, and a knowledge of the most efficient methods of relief and executive ability in the carrying out of details. We have known of cases in which one or more efficient inspectors of this character have been able most economically and efficiently to accomplish more for the health of our citizens than a whole police force. The State should see to it that our larger cities be more uniform in this kind of supervision.

3. It should be made the duty of the Common Council of each city through its Health Board, Health Physician, City Clerks, Assessors or Inspectors to have definite oversight of vital statistics; to inquire into neglects, and thus actively to aid in such measures as shall secure accurate returns. So important is a correctness in a general census conceived to be that our National Government and our State authority alike secure this as a part of their jurisdiction of the citizen. In no item is it so important as in that which relates to the social conditions, increase and decrease by death and sickness of the number and origin of the population.

It is now recognized that accurate returns of such statistics are indispensable to a full and accurate study of those preventable diseases which are now known to occasion over one-third of all deaths, and to add so enormously to popular invalidism. The average city father cannot be expected, amid so many other duties, to turn his attention to so special a study. But its importance having been authenticated by this State, as it now is by all advanced governments, it behooves that the State see to it that municipalities secure an accurate return, which, in time,

will aid them in comparing wards or localities within their own limits, and so help both State and city in conserving the general health.

4. We respectfully submit that some general law should define more closely what are the vested rights of cities, as well, indeed, as country districts, as to the definition of nuisances and their abatement, and how far the decisions of Boards of Health may be acted upon as final.

In many cases the action of appeal is such that the delay perpetuates a nuisance and renders it impossible, if such appeals are permitted to stay proceedings, for a Board of Health to act as it needs to do for the service of the citizen. Sanitary codes have now so far gained authority that it is no longer doubted that Boards of Health may be safely delegated full jurisdiction to the extent of abatement, being afterward, if need be, held responsible for their acts. Difficulties constantly arise as to the rights of such boards, unless they are, in part, defined in city charters or by general enactment. After the decisions of the last three years in the abattoir question in Boston, and in that of the Board of Health of New York City, it is quite in the power of general legislation so to enact, as greatly to simplify the method of relief, so as not to jeopardize the ultimate right of contestants, and yet so also as not to involve the life-right or right to life of those who are being injured while the rule is suspended. We beg leave respectfully to refer your Commission to the Massachusetts decision in the abattoir case and to the decision in the New York City case.

It is not the desire of our Board to claim anything that could at all be construed into an infringement upon the corporate jurisdiction of cities.

Neither is it our desire to condone anything in which cities, if left to themselves, are likely, by over-sight or by want of co-ordinate action, to jeopardize our whole civil and constitutional and health rights to a degree much more perilous than any exercise of general jurisdiction in matters so intimately pertaining to the welfare of all.

So definite has our knowledge become of the care of population as a great national resource and a great public economy, of the avoidable impairments to which it is subjected, and of the need of co-ordinate care of our cities, especially in those health matters,

which involve a common interest, we cannot but insist that general law should, at least, require local law, and should see to it that in important particulars local authorities are brought into such relations with State authorities as to secure information to the State of the condition of its cities, and co-operation in such matters as need both local jurisdiction and general tabulation and report.

We therefore beg of your Honorable Commission that you either prepare some form of law which in your high legal and official judgment shall secure such results, or that in your report you give to the views which our Board is thus permitted to present to you, the sanction of your distinguished approval.

In some slight legislation which the State Board of Health will have occasion to ask the coming winter, it would be the view of our Board to introduce a section requiring local Boards of Health, defining their powers, requiring an annual report to the State Board of Health, and requiring them to make it obligatory to inquire each year into any neglects of vital returns. Beyond this do we not believe it wise at present to go. While up to this point specification is needed, yet the actual exercise of power must be left to local authorities—with perhaps right of appeal if they choose in certain matters to the State Board of Health. In few of our cities we do now find sufficient power. There is also an absence of intelligent conviction on the part of the officers and of the people as to the necessity of exercising it, and a want of close and exact knowledge as to sanitary matters on the part of leading citizens. Law so far as really necessary is desirable, and when only a little in advance of popular sentiment is often educational.

Harm is done both by the absence of adequate authority and by enactments, which if not burdensome to the more enlightened sanitary communities, would be so to many, because too far in advance of public opinion, and if enforced react to the permanent discredit of a most important social interest. While this should not lead us to hesitate in asking what is really needed, it does lead the State Board to canvass with great care its own individual suggestions and those of others, and to seek a wise singling out and specification of what is now essential and

expedient rather than an attempt to prepare a complete sanitary code for our cities, which however broad in its enactments and penalties, would practically add too much to the dead-letter literature of our statutes.

September, 1879.

Signed, E. M. HUNT, M. D.,
C. F. BRACKETT, Ph. D.,
E. A. OSBORNE, C. E.,
Committee of State Board of Health.

UNDERTAKERS AS GUARDIANS OF THE PUBLIC HEALTH,

AND SUGGESTIONS TO THEM IN THE HYGIENIC MANAGEMENT OF BURIALS.

BY EZRA M. HUNT.

Next to the physician, no class of our citizens is so uniformly brought in contact with the localities of fatal diseases as are undertakers. When an epidemic is raging they must be most on duty. In the more common cases of prevalent and mortal disease, they are consulted in all the details of management. So important has this office been considered in some countries and States, that a license or registry is required. A want of knowledge on their part will prolong the risks of the sick room, may endanger themselves and their families and make them the common carriers of contagion to communities. It is of great importance not only that they know the proper conduct of a funeral in its convenient or artistic service, but that they be so intelligent as to methods of cleanliness and disinfection as by their appliances and advice to aid in diminishing the risk to public health often accruing from local disease. In a somewhat extended correspondence for the last two years, we have found many of them intelligent or inquisitive as to the new facilities for safety afforded by recent methods. Many, however, pursue their vocation, without any acquaintance with their art save the hearsay methods which they have casually adopted. Every occupation is ennobled, when, besides its mere formal duties it avails itself of opportunities for establishing its claims as an art. This is a ministry, not only of respect for the dead, but of comfort and preservation for the living. That expressive Anglo-Saxon word "undertaker," ought not only to mean one who takes people under ground, but one who undertakes to do something in the interests of those that remain.

We beg to impress all undertakers with the opportunity they have to benefit society in the interests of public health and to ask of them that they magnify their office in using it as an occasion of enforcing the strictest rules of cleanliness and disinfection. We greet them as almoners of the public health, and ask their co-operation in efforts to prevent the spread and fatality of disease.

Their sanitary relation and jurisdiction includes such cleansing, preservation and direction as to the dead body as shall make it least hazardous to the public health, and such dealing with the clothing, furniture and household where the death has occurred, as shall do most to prevent contagion or to diminish that less specific befoulment of the air which also is unfavorable to health.

The Jewish mode of sanitation, as revealed in Scripture and as illustrated in profane history, is well worthy of note as an ensample. Immediately after death the body was well washed, generally with a strong solution of native carbonate of soda called nitre. It was then well anointed all over with some fragrant oil. Most of the essential oils have disinfectant properties. In some diseases, as scarlet fever, for instance, oil serves a valuable purpose in preventing particles from the skin from floating in the atmosphere. Oil or vasaline can be used still with advantage. "The corpse was wrapped in linen, wound around the limbs separately, for the better effect of the embalming ingredients and the more perfectly to saturate the flesh." The Talmud describes the custom as a wrapping around of the separate limbs and a loose sheet over the whole. The use of ointment and spices seems to have been universal, although the kind and value of the spices varied with the rank or ability of the family. The spices were dry and finely powdered and sprinkled within the bandages, or wet and mingled with oils or resins. Myrrh, aloes, etc., were used in connection with more odorous substances, in order to combine astringent and preservative effects. It was not merely a substitution of odors, but an active disinfection. King Asa was laid in a bed of spices. In the embalming of our Saviour we are told that a hundred pounds of spices were given by Nicodemus. When a death occurred in the house, "according to their custom great quantities were burned to perfume the chamber, and especially to pay universal respect."

In the Egytian method for embalming, the body was anointed repeatedly with oil of cedar, myrrh, cinnamon, and was then put into a solution of the nitre or native carbonate of soda for about forty days, "by which process it was preserved from decay, retaining at the same time a life-like appearance." It was afterward taken out, wrapped up in long linen bandages dipped in myrrh, and then closed with gum.

The common people of Egypt were embalmed by means of bitumen, with which the corpse and its envelopes were smeared. Sepulchres have been opened in which thousands of bodies have thus been preserved in robes without coffins.

The Jews while not so elaborate in embalming for continuous preservation, yet in preparation for the burial carried out these methods to the full extent necessary for cleanliness and disinfection. The washing and anointing, the use of spices, and the bandaging of the body in linen seem to have been always used, although on account of ceremonial uncleanness and the heat of the climate, early burial or entombment was practiced. No corpse thus carefully cleansed, anointed, spiced and bandaged could possibly be a source of contagion. We do not wonder that the body thus prepared needed no coffin for the bier, but could be carried to the grave as much an emblem of purity as the white linen which enfolded it. In our modern plans we have more complicated but not more cleanly methods. We allude to this as illustrating the simple way of dealing with the dead body in a hot climate so to make it innocuous to the living.

We live in a period when very much is said about the communicability of disease and the methods of preventing it. Many instances are on record like that of 1878, in the yellow fever of Grenada, and the one as to diphtheria, occurring the same year in Monmouth county, in both of which it is alledged that the epidemic spread through the medium of the corpse. Boards of Health are issuing mandates as to non-attendance at funerals and non-exposure of the body in case of communicable disease. The Brooklyn Board of Health directs the burial of every child who has died of any infective disease within twenty-four hours, unless special permission is given to the contrary, and further that "the funeral of such person is to be strictly private, no other vehicle than a hearse being allowed." Chicago has had orders of similar rigidity. We regret the necessity of any law

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which limits the law of affection to this degree, or that so repels expression of sympathy in the time of bereavement. We are of those who believe it far more important to teach and insist upon rigid method of preparation for the dead body. It is within the range of present knowledge and of known skill for undertakers to deprive the corpse of any infective power, and, as a rule, to render it so safe that no such order needs to be promulgated. There are often reasons why garments or the furniture of the same room may at first hazard contagion, or why a funeral in the same building, instead of from an uninhabited assembly-room, might expose to some virulent contagion. But of all the things connected with the disease, the corpse, properly prepared, is the least likely to communicate a disease to those present at the burial if only properly cared for.

We proceed to outline the method of management by which to insure protection:

After death early attention must be given to any inward parts from which offensive discharges might escape. A small rubber hand-syringe or spray atomizer easily washes out the most accessible cavities, such as the mouth, nostrils, ears, with any of the disinfectants we have named. All openings from any internal organ or cavity should be neatly plugged. When, as from the bowels, much discharge might occur, an egg-shaped plug should be carefully adjusted. For this purpose a small wad of cotton or oakum may be saturated with the copperas or chloride solutions, or chloride of zinc, named in the article on Disinfection, or with tar or the sticky portion of turpentine.

Better still, carbolized paper or cotton can now be had at small expense and used dry. This is suitable where we must place some absorbent in the cavity of the mouth, inside of the teeth, or in the nose or ears.

WASHING OF THE BODY.

All garments that have been upon the body during the sickness should be removed, not to be replaced, and the body be laid for washing on a table or cot covered with paper or linen. The body should then be thoroughly wiped and cleansed all over with soda borax, in the proportion of a teacupful dissolved in a quart of water or the chloride of zinc solution. (See article

on disinfectants.) If soap is used it should be Castile or carbolized soap, the greases of which do not decompose so rapidly as those of laundry and scented soaps. Anointing with Vasaline is also good.

As the face and head are more especially exposed these need the careful cleansing and washing, and use of absorbents heretofore referred to. Where the hair is long it is desirable that it be partly removed, but if this is objected to, it also can easily and safely be thoroughly washed with the zinc solution. The ancient head-dress or cap easily concealed any change of the hair and would still be in taste if fashionable. It is always necessary that very careful attention be paid to the proper cleansing of the hair; in case of any unusual odor of any infectious disease the chlorinated soda or Labarraque's solution, or the chloride of zinc solution noted in the article on disinfectants, or a chlorine wash made by dissolving one quarter of a pound of chloride of lime in a quart of water may be used instead or in addition. The National Board of Health directs the use of a saturated solution of the chloride of zinc as a wash, and the wrapping of the body in a sheet saturated with it. Dry powdered borax sprinkled over the surface after the washing and wiping is an excellent cleanser. Sawdust well moistened with the chloride of zinc is also recommended to be placed in the coffin. Any sore or abrasion or wound should be cleansed when possible, and be freely covered with copperas wash, powdered charcoal, common salt, or any of the cleansing or drying articles above named.

A small bag of sawdust or fine shavings, or cotton or wool, interlaid with salt, borax or charcoal, may properly be closely pinned about the thighs. One good authority recommends that in some cases of delay or transportation the body should be covered with sawdust, to which has been added tar or a pound of ivory black, or other crushed or powdered charcoal, so as to absorb any possible gases, or to prevent escape of any fluid. Persons in attendance upon the sick or those laying them out do not increase their risks by such cleanliness. Indeed those who during sickness, or in caring for bodies after decease, are familiar with methods of cleansing and disinfection are those who themselves escape, besides protecting society.

In exhuming the dead, Blythe directs that all bodies should be covered with tar or saw-dust saturated with carbolic acid.

In the Franco-Prussian war tar was thus freely used. We think the styptic clays so plenty in New Jersey from which so much alum is made, when dry and ground may thus answer a valuable purpose as a cleansing and antiseptic covering.

A brine made of good common salt and a little saltpetre is highly preservative of bodies and is easy used and drained off by a screw opening.

Embalming, as practiced in modern times, seems to have been most successful with the use of a saturated solution of chloride of zinc. Burnett's Fluid, so valued as a disinfectant, is a chloride of zinc solution, although not so strong.

The Souquet, or chloride of zinc method, was tried at Paris in competition with others and so preserved a body that when exposed to the air fourteen months after, it dried without putrefaction. Richardson, in his experiment (1876) injected the saturated chloride of zinc solution into the tracheal artery and repeated it after six hours. The abdomen was emptied of air by a fine puncture and zinc colloid and a gelatinous preparation of zinc thrown in. The Milwaukee law requires that in all contagious diseases there shall be in the bottom of the coffin from four to six inches of saw dust saturated with chloride of zinc solution.

The chloride of zinc solution is now given the preference over all other disinfectants for this purpose. The 50 per cent. solution of Squibb which costs twenty-five cents per pound at wholesale, is sufficiently strong, and may be weakened unless there are some special instructions for active disinfection. As a wash of the body it is the best, as there is no risk of discoloration therefrom. While physicians who prepare and preserve bodies, prefer injection into the arteries, other simpler methods will answer for undertakers. A very small trocar, such as is used for piercing the abdomen in dropsy, can easily be used in the hands of any undertaker. We know of one city undertaker in this State, who, in hot weather, has often found it sufficient to inject from a pint to a quart of the solution by a small pierce into the abdomen which entirely closes itself on the withdrawal of the nozzle of the syringe. It is easy to have the nozzle of the syringe so shaped as to make the puncture by it. Where it is preferred the Fountain syringe may be used, and so the fluid be allowed to flow into any cavity. Since the invention of the

hypordermic syringe, it has been frequently shown how feasible it is to disinfect by merely infusing the zinc solution at various places under the skin.

All these slight punctures as well as those for chest or abdominal injections, can be made without any disfigurement, and are often far more practicable than the ponderous methods now in use. We know of no prominent department of handiwork in which there is more opportunity for improvement.

With these internal methods of preservation by the introduction of fluid into closed cavities, and with the proper cleansing and disinfection of the outer body, the corpse can be preserved for the necessary period previous to the funeral.

When in piercing any internal cavity there is confined gas or foul odor escaping, it is easily absorbed by holding over the tube a small sponge which has been soaked in the chloride of zinc, or other disinfecting solution. Some who have expressed dissatisfaction with present methods, are now using the Egyptian embalming fluid, or other patented articles. There are plans of body preservation now in use in all our medical colleges, which are equally applicable to the preservation of bodies for burial. No doubt the more thorough method is to inject into the arterial system. A large artery in the neck or beneath the collar bone is easily exposed and opened by a very slight incision. • A hollow needle is inserted and tied in place, then the chloride of zinc is slowly and not too forcibly injected. Not over three quarts are generally needed.

An intelligent undertaker of this State has informed us that he has always succeeded by filling the abdominal cavity through a small opening, into which he introduces the tube of a Davison's syringe. All external methods of cleansing being also attended to. Each chest cavity is thus easily infused with a few ounces. Even this would only be needed in hot weather, or when the body is to be preserved for transportation, or in case of some epidemic disease. The puncture should be made just below the navel or for the chest, between two of the ribs of the right side.

It speaks little for science or art, that so cumbersome and expensive an apparatus as the ice-box is now our only reliance.

We insist that both the undertaker and those who employ him should come to recognize his care to extend to directing the

preparation of the body for burial, as well as to other arrangements. If fear of disease or carelessness leads him to neglect these matters, he is not less exposed and does not accomplish a high part of his mission. We believe that friends pay as readily for these exact and skillful attentions as for the mere mercantile oversight.

The undertaker needs not only practice, but a technic knowledge of his art. The spray forms of syringes, trocar, sponges, carbolized paper and cotton, bandages, wadding, two or three of the most approved disinfectants, all put up in a case of convenient form, belong as much to his art as does the medical case to the physician.

The last ten years have developed possibilities of care for the dead wholly new and greatly valuable. We believe the time not distant when the occupation will be followed as an exact sanitary art, and become a great adjunct in the checking of contagious diseases. The art of preservation and disinfection is now so complete that if only the undertaker knows the details of proper cleansing and dressing, and keeps himself supplied with the proper appliances of his art, he will not only add to his own skill but make himself a worthy and effective custodian of the public health.

It is greatly important, also, that the care of the undertaker should extend to the surroundings of the fatal sickness.

He should learn how the rooms may be made least likely to convey disease or to deteriorate the air. We have many times attended at funerals where both the coffin and the room that contained it has been closed for some time before. The stifled air thus charged with particles of decay, even in cases of non-malignant disease, has occasioned faintness and discomfort which might have been avoided by a flushing of fresh air and removal of close curtains.

The undertaker should be familiar with the use and value of circulating air, cleanliness and disinfectants, both for the house and the premises, and often more than any one else just at this time is in a position to give advice and direction which will be heeded and obeyed.

We designedly associate an article on disinfectants with this number of our report, and send the report to the undertakers in the State, that they may thus have ready at hand a partial guide

in so important a relation to the public health and common welfare.

COFFINS.

A word needs to be said in reference to the coffins at present in use. The heavy wooden or iron coffins are only defensible in cases where the dead must have long transportation before burial. In usual cases, the body between death and burial, unless kept in a preservative liquid in a coffin, does not need an attempt at exclusion of air, which only means air confined so as to become unpleasant. Proper preparation of the body, free access to air, and a placing of the corpse in the coffin only a short time before burial is the better custom.

We fully agree with the views expressed by Haden, Richardson and others, that the coffin should be nothing more than an easily destructible shroud, in which the mortal remains may be placed until they are deposited in the earth. "The present coffin," says Richardson, "is after the mode of an Egyptian sarcophagus and is probably an imitation of that receptacle. In the *form* of the receptacle there is nothing objectionable, and if the popular taste wills that it shall be maintained, so be it. But the *structure* must be so modified that the instant the body is placed in the earth, it shall either be in direct contact with its surrounding earthy matter, or it shall be separated from it by some simple organic material that is easily and rapidly destroyed." If persons desire their friends preserved after death, let us go to embalment now so simple and expedient, or else let us not long interrupt natural decay, and by an artificial method, substitute a process most loathsome, and wholly destructive of natural methods of decomposition and soil appropriation. A revolting, but true picture has recently been drawn by an eye-witness, of an old grave yard exhumed, as showing how soil was contaminated, water courses befouled, and death itself made more hideous. We have recently lighted upon another description of a yard prepared. It is wonderful how quickly a carbonaceous soil or one of sand-lime and carbonaceous matter mingled, will dispose of remains placed in it free from woody coverings.

The Messrs. Turnbull, of Glasgow, desirous of illustrating the power of charcoal as an absorbent and deodorizer buried a horse in an eight-inch surrounding thereof. In twelve months the whole except the skeleton was absorbed without in the mean time the least trace of decomposing effluvia. Porous and well drained earths have a power quite analagous. In such soils it is stated that complete removal of a human body has taken place in five years, and complete destruction of all but bones and sinews will take place in twenty to thirty weeks. If we mean earth to earth, dust to dust, it is better to let it be accomplished in the time which nature attempts. The earth to earth coffins of the London Metropolis Company, or the wicker coffins now in frequent use in England, have many advantages for crowded populations, and will to some degree interrupt the plan which in our cities "has led us to accumulate in our midst a vast store of human remains in every stage and condition of decay." The Japanese bury in sitting posture, and often after the coffin is in the grave, thrust aside the thin lid and so give a free access to the earth.

While we may not expect any sudden change from confirmed methods, it is well to have attention directed to modifications which may be desirable. The woods at least from which coffins are made might be much lighter. Where preservation is desirable for transportation a proper lining of antiseptics and proper preparation of the body for burial will do far more than an attempt to make air tight by boxes.

The welfare of the living and a guarding against the spread of disease, must not be lost sight of, while all proper respect is shown for our departed ones. Indeed, it is a recent tendency to constrict attendance at funerals within too narrow limits and almost to prohibit tokens of affection, that has in part led us to inquire whether there is not a care and preparation of the dead for burial, such as limits rather than extends disease, and so makes funeral obsequies consistent with assured protection from infections.

We believe the protection of personal and public health is quite in accord with attendance upon the remains of those who are removed from us. But this means a preparing for burial quite different from that now practiced. It means cleansing, anointing, disinfecting, preparation and burial as a distinct,

explicit art; not as a trade which can be taken up at random. It has definite rules which, if carried out, will insure against danger of infection from the dead. It means suggestions to the immediate household as to their own clothing and vicinage, which, with the careless or uninformed, are far more riskful than the person deceased. It means disposal of remains which shall be compatible with the highest interests of the living.

All this adds sacredness and solemnity and token of respect, for the law of purification and cleanliness like the law of carefulness for all human welfare has in it the very essence of respect, honor and affection. The death of the flesh seems to us more like the life of the spirit, when thus it is decently conveyed to the earth so as to closely obey the processes of nature and soon become a part of that vitality which shall remain until the former is restored.

To all undertakers we commend their work as an art, as well as a service, and ask them in it to recognize themselves as capable of conserving some of the most important sanitary interests of society.

SANITARY LEGISLATION.

BY E. S. ATWATER, ATT'Y.

INTRODUCTION.

The necessity for sanitary legislation or legislation to protect the public health, is founded in the ignorance, negligence and selfishness of mankind. In a large community there are a vast number of people who are utterly ignorant of the fact that human life may be prolonged, and the general health and the health of the individual be promoted by following the simplest sanitary precautions. But we may go a step further. There is also a tendency to neglect matters of this nature even where there is some knowledge on the subject. People think there is no hurry about attending to such things, and they let them go until the evil has been done and the seeds of disease are not only planted but growing up. But beyond this is the inherent selfishness, meanness or parsimony, by whatever name it may be called. Sanitary measures cost something. They may even cost the destruction of property to do them properly. The landlord who is reaping large rents from the overcrowded and filthy tenement, has no ear for sanitary improvements. They might in the end make his property more valuable, but he has a sharp eye for his present gains. Hence unless some power is brought to bear from without, some agency that has power to do the thing required, if necessary, in many cases nothing will be done, and, generally, progress will be slow.

The basis or foundation of sanitary legislation is in what is termed the "police power." It is a power often referred to in legal works. Says Mr. Justice Field, of the United States Supreme Court: "That power undoubtedly extends to all regulations affecting the health, good order, morals, peace and safety of society, and is exercised on a great variety of subjects, and in almost numberless ways. All sorts of restrictions and burdens

are imposed under it, and where these are not in conflict with any constitutional prohibitions or fundamental principles, they cannot be successfully assailed in a judicial tribunal."

Says Mr. Justice Miller of same court, referring to police power: "Upon it depends the security of social order, the life and health of the citizen, the comfort of an existence in a thickly populated community, the enjoyment of private and social life, and the beneficial use of property."

Says another Judge: "It extends to the protection of the lives, limbs, health, comfort and quiet of all persons, and the protection of all property within the State, and persons and property, are subjected to all kinds of restraints and burdens in order to secure the general comfort, health and prosperity of the State; of the perfect right of the Legislature to do this no question ever was, or upon acknowledged principles ever can be made, so far as natural persons are concerned."

But while such is the substantial foundation on which sanitary legislation rests, to-wit, that general welfare must be protected, even if it is at the expense of some individuals, yet this very principle shows us that, in the nature of things more or less opposition will be developed to the execution of all sanitary laws. It has been claimed, and is now and doubtless will be claimed, that such laws interfere with vested rights, that before a health officer does anything there must be a trial by jury and objections of similar nature. Hence it is obvious that such laws must be framed so as that while they accomplish the end arrived at, they do not interfere with private rights any more than is absolutely necessary.

A municipality has no inherent power to enforce sanitary measures. The powers of municipal corporations are based entirely on legislation, and they must act within the scope of such legislation. If, therefore, no powers to make sanitary regulations have been conferred upon a municipality by the Legislature, it follows that such municipality has no such powers. The public good alone is not a foundation upon which a municipality can act.

SUBJECTS OF SANITARY LEGISLATION.

I now pass to consider some of the subjects which properly come within the scope of sanitary legislation.

1. The gathering and diffusing of information on subjects relating to the public health, including the Department of Vital Statistics. Knowledge must precede action; knowledge as to whether a state of things exists which requires action of a sanitary nature; knowledge from which deductions and generalizations can be made as to the growth and spread of disease, and the causes which produce an unwholesome sanitary condition; knowledge as to the result of measures undertaken to promote the public health; and finally, knowledge as to the best methods to be applied for the promotion of the public health. These generalizations and conclusions, to be of value, must be derived from large observations.

It is impossible to estimate too highly the value of Vital Statistics carefully gathered.

Says an eminent writer: "Considered *physically*, the main object of a correct civil registration of births, deaths and marriages, is to aid in disclosing the causes of disease; considered *legally*, the object is to provide the means of tracing descent and proving personal identity; and considered *politically*, it is to assist the government in arriving at correct conclusions with regard to measures of internal economy, taxation, employment and commerce.

As the world no longer affords one instance of the unanimous agreement of the people of any one country for one form of religion, governments can no longer prudently leave the registration of births, deaths and marriages, solely to the minister of the State Religion, if there be one.

In regard to the matter of diffusing sanitary information, I quote the remark of Dr. Elisha Harris, the eminent and thorough Registrar of Vital Statistics of the Metropolitan Board of Health of New York, as follows: "The task of perpetual cleansing and sanitary renovation by the civil authorities of Boards of Health, though conferring great present benefits, needs to be aided by popular and definite sanitary instruction, else all this present endeavor might prove to be another work of Sysiphus, and the people might forget that they have any personal concern in the efforts of sanitary officers."

In this connection I deem it proper to refer to the very excellent and timely suggestions and directions, issued by the State Board of Health of New Jersey, during the past season.

2. The practice of medicine and the sale of so-called medicines, is a subject that properly comes under the head of sanitary legislation, when it is considered how much harm may be done by unlearned and unskillful practitioners, and the health-destroying compounds which are put forth under the name of medicines, it is evident that there is scope for legislation in this regard.

In this State the law has gone to the extent of providing a competent and educated body of physicians, through the medium of the State Medical Society. It would seem proper to provide for an examination of all who desire to practice medicine, by a competent medical board; that all who engage in the business of compounding medicine, should pass an examination to test their competency, and also to regulate the sale of medicine, so as to protect the public against the nostrums of quacks.

3. Vaccination and other measures preventive of disease. It is not my purpose to argue the importance of vaccination. When we consider the danger to a community of a single case of small pox, not properly isolated, and the peril to which an unvaccinated person is exposed, it is obvious that the authorities should be empowered to provide for thorough vaccination.

4. The regulation of noxious trades and business, including manufactories. Here it would seem at first sight that there might be danger of interfering with private rights, and that legislation relating to such matters might be opposed to fundamental principles in regard to the property and the right of the individual to use his own. There are businesses, such as slaughter houses for instance, which are absolutely necessary and must be carried on, but at the same time there existence in a thickly settled community is fraught with danger. The subject has been thoroughly discussed and the right of the State to enact such laws, has been affirmed by the United States Supreme Court in certain cases which came up from the State of Louisiana and are known as the "slaughter-house cases," reported in volume 16, Wallace's Reports. I deem the matter of sufficient importance to give a brief synopsis of the cases. They grew out of an act of the Legislature of Louisiana, entitled "An Act to Protect the Health of City of New Orleans, to locate the stock landings and slaughter houses and to incorporate 'The Crescent City Live Stock Landing and

Slaughter House Company,'" which act was approved in March, 1869. This act granted to a corporation created by it, the exclusive right for twenty-five years to have and maintain slaughter houses, landings for cattle and yards for enclosing cattle intended for sale or slaughter within the parishes of Orleans, Jefferson and St. Bernard, in that State, (a territory which it was said contained 1,154 square miles, including the city of New Orleans, and a population of between two and three hundred thousand people), and prohibiting all other persons from building, keeping or having slaughter houses, landings for cattle, and yards for cattle intended for sale or slaughter within those limits, and requiring that all cattle and other animals intended for sale or slaughter in that district should be brought to the yards and slaughter houses of the corporation, and authorizing the corporation to exact certain prescribed fees for the use of its wharves and for each animal landed, and certain prescribed fees for each animal slaughtered. The court held that this grant of exclusive right and privilege, guarded by proper limitations of the prices to be charged, and imposing a duty of providing ample conveniences, with permission to all owners of stock to land, and of all butchers to slaughter at those places, was a police regulation for the health and comfort of the people, (the statute locating them where health and comfort required), within the power of the State legislatures, unaffected by the Constitution of the United States.

I may, in passing remark that this law affected the business of some 1,000 persons, and that individuals and associations of butchers brought suits to prevent its being carried into effect, and that the matter was thoroughly litigated with the result I have stated, thus showing conclusively that there is no fundamental objection to the class of legislation referred to.

5. Providing sufficient means for dealing with nuisances, including their abatement and removal. Of the absolute necessity of vesting in some body power to deal with nuisances which imperil health in thickly settled communities, there can be no question. If the community is to be left to the ordinary machinery of an indictment or other proceedings of that nature it is obvious that the progress in enforcing sanitary regulations will be slow. If, on the other hand, there is an organization whose care is the public health, and whose duty it is to establish

sanitary regulations, and then to enforce them, we may expect systematic and substantial improvement. Of the manner of dealing with such matters, I shall speak hereafter.

6. Efficient sanitary inspection of dwellings and public buildings, particularly schools as to proper ventilation, drainage and other sanitary precautions and disinfecting generally: There can be no question that the health is in danger in a large gathering of people in buildings where the atmosphere becomes fœtid from lack of proper ventilation, and noisome gases are exhaled from defective sewage arrangements. It is a too common occurrence that one after another in a family is stricken down with disease, the causes of which are found to be in the unwholesome sanitary conditions of the dwellings.

7. The regulation of trade in articles of food to the extent of preventing the sale of unwholesome articles is also a proper subject of sanitary legislation. It is a well-known fact that many things manufactured for use as food, are mixed and adulterated with substances which have no nutritive elements, and are in many instances of a deleterious character. Then again, stale meats, fruit and vegetables are often offered in market at low rates. The danger to health in this manner, especially in the warm season, need not be enlarged upon. Then again, there is the danger of diseased meat being put upon the market. Against these things the individual purchaser cannot protect himself always if he would. Hence the necessity for some legislation which will efficiently protect the health of the public in this regard.

8. Quarantine Laws. Such laws come under the jurisdiction of the States. The happy effect of such laws is seen in that while vessels containing persons sick with pestilential and contagious diseases arrive at the port of New York, yet these persons are rigidly kept out of New York City, and such vessels are subjected to thorough fumigation and disinfection. There can be no doubt that it was due to the vigorous enforcement of the quarantine law during the past season that yellow fever was kept out of the great cities at the head of New York Bay. Such measures, no doubt, require the exercise of a great deal of authority on the part of those entrusted with their enforcement but the common sense of mankind concedes their absolute necessity.

Quarantine regulations also relate to the separation of indi-
iduals afflicted with contagious diseases and even of whole
ommunities where such diseases are prevalent.

It may be added that there are a variety of other matters,
vhich are proper subjects of sanitary legislation, such as keep-
ng pure the water supply of cities and villages, the prevention
f the overcrowding of tenements, proper sewage and the like,
ut I do not deem it necessary to go further into detail. It is
bvious that there is a broad field for wise sanitary legislation.

We come now to consider the jurisdiction within which sani-
ary powers may be exercised. The subject of the public health
s a matter of large importance. It is not limited to any State
r municipal boundaries. It is scarcely a year since the public
ealth of the people of this country was imperilled by the
avages of a contagious disease which had become epidemic in
ome of our large cities. To the coping with the disease in such
roportions no State or local health authorities are adequate;
oncerted action is required. The general government rendered
what aid it could under the circumstances, but there was no
National Health Board to bring to bear its power in the
mergency. So important was this matter felt to be that at the
ast session of Congress a law was passed establishing a National
Board of Health. A United States Senator has said, "At the
ast session nearly $1,000,000 was voted to be used to combat
ickness in the South, and under powers and discretion such as
o act of Congress ever conferred before."

The National Government has also felt called upon to inter-
ene for the protection of the public health by the establishment
f National Quarantine law. By a law passed in 1878, United
States officials are required to co-operate with State officers
n the enforcement of the State Quarantine laws.

By other laws of the United States the Quarantine laws of the
States have been recognized.

Much doubt, however, has been expressed as to the power of
Congress, under the Constitution, to pass general health laws,
nd while it would seem for the public good that Congress
hould possess some power in this direction, it is not within the
rovince of this paper to discuss the constitutional questions that
ave arisen.

But whatever constitutional objections may exist in regard to sanitary legislation by the general government, no such objections apply to the actions of the State governments, the theory of our system being that the States retain such powers as are not delegated to the general government. As has already been shown, the police power is exercised in a variety of ways. Probably all the States have exercised this power, in some measure, as to matters relating to the public health; but it would seem for the most part to have been done in reference to particular localities and on special subjects, as attention may have been called to them, rather than the enacting of a system of laws pertaining to the subject or a general system of enforcing such regulations. It would seem necessary to any proper regulation of these matters, that there should be some central authority or health board in each State, having some general powers, such as gathering vital statistics and other information, and diffusing the same, and supervising the local health authorities, giving them aid and direction, and setting them in motion, if necessary. In New Jersey a State Board of Health was established by law in 1877. Its powers were limited to gathering information and making reports. In 1878 a law was passed providing for the registration of births, marriages and deaths, and in 1879 a law was passed authorizing the State Board of Health to take action, with a view of setting in motion the local health authorities in the matter of abating nuisances. It will thus be seen that in this State sanitary legislation is making progress in the right direction toward dealing with the problems relating to the public health in a systematic manner.

Some of the Western States have been forward in the matter of sanitary legislation. Minnesota and Michigan have comprehensive health laws.

I present a brief synopsis of the system in Michigan:

SANITARY LEGISLATION IN MICHIGAN.

In the year 1873 the Legislature of the State of Michigan established a State Board of Health, consisting of seven members.

Their duties are summed up in the law as follows: "The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State. They

shall especially study the vital statistics of this State, and endeavor to make intelligent and profitable use of the collected records of death and sickness among the people; they shall make sanitary investigations and enquiries respecting the causes of disease, and especially of epidemics, the causes of mortality, and the effects of localities, employments, conditions, ingestra, habits and circumstances as to the health of the people."

The local health authorities are required to report at least once a year to the State Board.

The laws of Michigan also make ample provision for the collection of vital statistics.

In 1846 laws were passed establishing Boards of Health in the towns, villages and cities. The powers given to the Boards in the different orders of municipalities vary somewhat, but would appear to be full and ample. In particular, they provide prompt methods of abating nuisances.

SANITARY LEGISLATION IN MASSACHUSETTS.

In the State of Massachusetts much practical work has been done in sanitary matters which it would be interesting and profitable to consider if time would permit.

A State Board of Health was established in 1869. Its powers at first were principally advisory, and to gather and diffuse information, to make investigations, &c. Subsequently, however, it was clothed with certain executive powers, such as, in certain cases, after hearing, to order parties engaging in trades which are injurious to public health, to desist from the same.

The reports of this Board have been very carefully prepared from year to year and are full of valuable theoretical and practical information as to sanitary matters.

In the general laws of the State, published in 1860, is a chapter, entitled "Of the Public Health and Burials."

Provision is made for local Boards of Health in the towns and cities, and their powers are defined. These Boards are authorized to make regulations for the public health and safety, respecting nuisances, sources of filth and causes of sickness within their limits. They may make orders for the abatement of nuisances after short notice, and may abate the same, if necessary, at the expense of the owner of the property.

They may also asssign places for carrying on any trade or employment which is a nuisance or dangerous to the public health, or the exercise of which is attended by noisome and injurious odors and may prohibit the exercise of the same in places not so assigned. The Board may also forbid the exercise of such trades within the limits of the town or any particular locality thereof.

Provision is made for the service of such order of prohibition upon the proper parties, and if the same are not obeyed within twenty-four hours, the Board are to take all necessary measures to prevent the exercise of the offensive trade, and the person refusing to obey becomes liable to fine.

Any person aggrieved by such order may appeal therefrom and shall, within three days after service of the order, apply to the proper court for a jury to try the question, and during the pendency of the appeal, the offensive trade or employment shall not be carried on contrary to the order, and upon any violation of the same, the appeal shall forthwith be dismissed. The verdict of the jury is to be passed on by the court and may either affirm, annul or modify the order appealed from. If the order is affirmed by the verdict, the town shall recover costs against the appellant; if it is annulled, the appellant shall recover costs and damages against the town.

LOCAL HEALTH BOARDS.

It must be obvious, I think, that in order to efficient sanitary work, there must be local authorities having health powers, a body of some sort in each community or municipality, having charge of the measures pertaining to the health of such community or municipality. No State Board of Health can be adequate to the enforcement of the sanitary regulations necessary to the protection of the health of each particular community.

Health Boards should be so constituted as not to have any political or partisan bias, for in matters of this kind, the body having authority to act, should be independent and non-partisan. Hence it would follow that such powers should not be vested in an elective Common Council or other city government. But again, in dealing with matters of public health, knowledge is required. Hence, in a proper Health Board, medical men

should be found. It might not be advisable to make up a Board entirely from the medical profession; but that profession should furnish a large and influential element in any Health Board that would efficiently and intelligently discharge its duties.

Still further, a Board of Health should be a permanent body and not reconstructed each year. The terms of the members should be for long periods, and should not all expire at the same time. In this way the result of experience can be more efficiently applied, and the methods inaugurated can be perfected and carried to completion.

Probably most, if not all the cities of New Jersey, have some provision in their charters for Boards of Health, or authorities of that kind. It will be found however, I think, that the powers given to them are of a general nature, and that no methods are prescribed for dealing with the very important matters that come before such bodies, and in general that their authority is somewhat vague and undefined in its character.

SANITARY LEGISLATION IN ENGLAND.

Some reference to sanitary legislation in England will, I think, prove instructive. The matter has received great attention in that country. Commissioners have been appointed from time to time by act of Parliament to inquire into the subject, and voluminous reports have been made by them. The result has been a body of sanitary legislation of great importance, and practical value, and great good has been accomplished by diminishing the death rate and advancing the conditions of good public health. The ravages of cholera led to the passage in the year 1845 of the Nuisance Removal Act.

In 1848 the Public Health Act was passed by which a general Board of Health was established, at the head of which was a President appointed by the Government. In 1858 the powers of the General Board of Health were given to the Privy Council.

In 1855 other nuisance acts were repealed and a Nuisance Removal and Disease Prevention Act was passed. This act contains some stringent definitions of nuisances. By means of these definitions a variety of causes of disease are brought within the operation of the law.

The local authorities can give notice for the removal of any nuisance, and if this is not attended to, a summons can be issued and offending parties brought before a magistrate. In certain cases also where works are necessary to be done, the local bodies can do the work and charge the person on whose premises the nuisance has existed.

The duties of a medical officer of health and of a sanitary officer are also recognized; and these officers have power given them to inspect premises where they suspect a nuisance to exist. The law provides for inspectors to inspect articles of food exposed for sale, and if found bad to bring offenders before a magistrate. These are only a few of the provisions of the act. I quote the following remarks in regard to the English system:

"The sanitary laws not only extend to more subjects, but they are more stringent, and are enforced by a more discriminating public sentiment and a more vigorous administration than here. All England, for example, is divided into 15,000 sanitary districts, with a sanitary authority in each, and since 1872 there has not been a spot on the surface of England that has not been liable to feel, and, if it needed, which has not felt the direct exertion of such authority. These 15,000 small districts are grouped into twelve larger divisions, and in each of these divisions there is an inspector, who reports directly to the 'Local Government Board,' in London, and over that Board is one of the Secretaries of the State, who is a member of the Cabinet. Connected with the Board is a chief medical officer—now Dr. Simon, perhaps the greatest sanitarian in the world—who has a similar relation to the Privy Council. The system is not a centralized or imperial one, but is such as to devolve the duty and responsibility as to each of the 15,000 districts, mainly upon its own local sanitary authority. But if in any district the death rate or expenditure is too high, those responsible for it are liable to account for it to the Local Government Board.

If local complaints are neglected or nuisances are allowed, one of the twelve inspectors will soon appear in the district and make an investigation.

All accounts of expenditures by each of these 15,000 authorities must be made up in a common form, and they are supervised by the 'Local Government Board.'"

THE METROPOLITAN BOARD OF HEALTH OF NEW YORK.

This Board owes its existence to the necessities of the city of New York, and vicinity. No one will, I think, contend that ample health powers should not be vested in some authority for the protection of the health of that great city—the commercial centre of the country. This Board was established in 1866. Prior to that, health powers had been vested in the Common Council and had been exercised in a very inefficient manner. That Board at its organization consisted of nine members—three of them physicians, one the health officer of the port, one layman, and the other four the four Police Commissioners of New York city. The number has since been reduced, leaving the physicians the predominant element. The district included was the counties of New York, Kings, Westchester, Richmond and a portion of Queens, thus embracing New York City, Brooklyn, Staten Island and adjoining districts. It has since been reduced in extent. Health powers of the largest kind were conferred upon this Board, and the Board proceeded to put them in effect, enacting a health code which deals with a great variety of matters, and involves a great deal of system and energy in giving them proper effect.

In the report for 1867 (the 2d report) we find the following language:

"The Health Department of a great commercial district, which encounters no obstacles and meets with no opposition, may safely be declared unworthy of public confidence, for no sanitary measures, however simple, can be enforced without compelling individuals to yield somewhat of pecuniary interest, or of personal convenience to the general welfare."

The Board did meet with such opposition, and litigation of the most determined character followed. Parties whose alleged rights were interfered with by the Board of Health, organized and sought redress in the courts against the action of the Board, but without success. The results of the litigation are thus stated in the report of the Board for the year 1868, on page 155, by the Hon. Dorman B. Eaton, then counsel of the Board, a gentleman who has given great attention to these matters:

"1. That it was within the constitutional power of the Legislature to create a Board of Health, the members of which

should be nominated by the Governor and confirmed by the Legislature or Senate.

2. That such Board had the power to pass ordinances, reasonable and proper to be observed, for the protection of life and health within the Metropolitan Health District, and that the penalty fixed by law as recoverable against those who should disobey them could be recovered.

3. That the Board had authority to make proper orders for cleansing premises, and for removing causes that made nuisances by endangering the public health, etc., as the law provides, and that such orders could be enforced.

4. That such orders (reasonably made) do not take private property for public use, or impair property or business, in any such sense as gives a right of compensation or of trial by jury.

5. That the courts have no right to ignore the action of the Board whether by ordinance or order, and to enjoin the action of the Board without the record of its action being before the court for review, and that before the action of the Board can be set aside it must be made to appear that it exceeded its discretionary jurisdiction or abused it through recklessness, bad faith, or for other indefensible reason.

6. That the action of the Board, both by order and by ordinance, against slaughtering and cattle driving in densely populated portions of the city of New York, was in all respects legal and proper, and it was sustained by the decision of the Court of Appeals in each of the four cases carried to that court.

Thus it will be seen that while the Board is declared to possess adequate powers for the important purposes for which it was created, it is at the same time subject to that species of judicial supervision which will be a protection against every attempt to exercise unwarranted authority."

The method of dealing with nuisances is thus detailed in the same report, page 158:

"Since my last report, and especially since the decision of the Court of Appeals, the Board has adopted to a much greater extent than previously, the policy of abating nuisances by means of suits in the courts to recover penalties for violations of the law, or of its order or ordinances. This policy has been found most successful. Owners of real estate, previously in many

cases, neglected the orders of the Board, and allowed it to do the work commanded, while now a suit promptly brought for the recovery of a penalty, stirs such persons to immediate action. The enforcement of the provisions of the "Tenement House Law," so called, is by that law made to depend entirely upon suits for penalties.

The course which has now been adopted as to violations of this law is as follows: When the report of an inspector is received, showing a violation, it is at once laid before the Board, and a direction to commence a suit is obtained. Notice of this fact is then given to the owner or lessee, and he is allowed fifteen days in which to remedy the evil complained of. If more time is needed it is granted on application. If at the end of the time it is found that the evil has not been remedied, an action is at once commenced in one of the District Courts. The judgment is always one hundred dollars, but in practice, the amount taken varies greatly with the circumstances of each case. At first, many suits were discontinued without any judgment, as soon as the law was complied with. Subsequently the rule was made to require the payment of costs, and now the ordinary payment demanded in each case is thirty dollars. This seems enough to enforce obedience to the law, while it is not oppressive.

In at least three quarters of the cases the evils are now remedied without suit. No case is settled unless the remedy is applied. The number of cases under the "Tenement House Law," in which suits have been ordered within the year, is 3,339 in New York, and 417 in Brooklyn. The number actually brought is 979, of these 741 have been disposed of and 185 are now pending."

From the report for 1874-5, it appears that during the period extending from April 1, 1874, to January 1, 1876, 5,218 suits were commenced by direction of the Board for non-compliance with orders of the Board, and for violation of the sanitary code.

The result is thus stated by W. P. Prentice, Esq., Attorney and Counsel of the Board, in his report to the Board of Health:

"In nearly all of these proceedings in behalf of the Board the defendants have called in person or by attorney at this office, and entered into proper stipulations to abate the nuisance complained of or rendered necessary explanations. As far as

practicable a liberal method of adjustment of these actions has been applied, the chief aim having been to secure the removal of the cause of complaint without undue hardship to the responsible party. As a result of this policy the owners of property respect the authority and will of the Board, as expressed in the orders entered from week to week, for the abatement of the various nuisances constantly accruing in this city."

Judge Woodruff, of the New York Court of Appeals, used the following language in regard to this Board:

"The importance of sustaining that Board, in all lawful measures, tending to secure or promote the health of the city, should make us cautious in declaring any curtailment of their authority, except upon clear grounds. On the contrary, powers conferred for so greatly needed and most useful purposes, should receive a liberal construction for the advancement of the ends for which they were bestowed."

THE METHOD OF DEALING WITH NUISANCES.

At the outset it may be remarked that the courts have sustained the rights of individuals to abate a nuisance, as in the case of Meeker vs. VanRensselaer, a New York case reported in 15 Wendell, p 397. In this case, the defendant, during the prevalence of the Asiatic Cholera, acting under an ordinance of the city of Albany, tore down a tenement house in the ward in which he resided, that belonged to the plaintiff, which was filled with families of poor people who allowed the house to remain in a filthy condition, which endangered the health of the city, and who neglected to clean the house or to remove therefrom, after notice to do so. The court, in passing upon the question of the defendant's liability, held that he was justified in his act, by the extraordinary emergency, but not as an official of the city, but as a citizen of this city interested in the maintenance of its health, particularly in the ward in which he resided.

Substantially the same doctrine is held in Manhattan county, vs. VanKeuren, a case in this State reported in 23 New Jersey equity reports, p 255.

The difficulty with such action is that the party thus taking the law in his own hands takes upon himself the risk that the thing which he attempts to abate may not be a nuisance in the eye

of the law, and of course if he errs in judgment he would be liable.

As has already been intimated, the subject of dealing with nuisances gives rise to questions of great difficulty and delicacy. Can a Board of Health proceed to abate a nuisance if, in their judgment, the public health requires such action? Can a Board of Health adjudge something to be a nuisance and then proceed to remove it, or must action be delayed until a judicial tribunal has passed on the thing complained of, and declares it to be, in the eye of the law, a nuisance? In other words, can the Legislature constitute Boards of Health with such powers and modes of procedure that they can determine the question of nuisance and lawfully proceed to abate a nuisance if they decide that it actually exists?

In any event it may be promised that the Courts will keep such Boards within the powers actually conferred and to the mode of procedure prescribed.

In Weil vs. Ricord 9, C. E. Green, page 169, a case arising out of the action of the Board of Health in Newark, in this State, the Court of Chancery restrained that Board from prohibiting certain parties from carrying on the tanning business, but left the Board free to compel these parties to carry on the business, in such a manner, that the same should not be injurious. But in regard to the main question, which is comparatively a new one, and does not appear to have been passed on in many States, so far as I have examined, a different ruling has been made in different States. In New York and Pennsylvania, the action of Health Boards in deciding upon the question of nuisance, has been sustained. In this State, a different view has been held. I refer to the case of the city of Camden vs. Hutton, reported in Vroom, page 122 in which the Court of Errors took strong grounds against the decision of Health Boards as to nuisances holding such decisions to be of no force or effect. See, however, important opinions in the Supreme Court on Sanitary Laws and Rights in case of Marshall vs. City of Trenton, 6 Vroom, page 84; also, in case Matter of Drainage along Pequest River, 10 Vroom, 434; see also case of Weil vs. Ricord 9, C. E. Green, 173.

There would seem, however, to be no valid objection to investing Health Boards with powers such I shall name. I offer these suggestions as a plan by which efficient work may be done in the

point out the local conditions and social circumstances out of which more than twenty-five in every one hundred who die might be saved to riper and more useful years of life, under the influence of improved hygienic conditions."

Sanitary science proceeds on the principle that much of the sickness and disease which affects mankind is preventible, or, in other words, is due to certain conditions which produce them and which are removable. It is the province of wise legislation to enact laws which shall guard against, and as far as possible remove such conditions, and to put into practical effect the lessons which sanitary sciences teaches.

The results of practical sanitary measures are not alone found in the reduction of the death rate. The same causes which tend to reduce the death rate operate in much larger measure to reduce the sick list. In the words of another, "The gain to the common stock of healthy and vigorous life, in a population, is twenty-fold greater than the few added years of worldly comfort and usefulness that are represented by the number of persons at given ages, saved from premature death."

METEOROLOGICAL TABLES.

SUMMARY OF OBSERVATIONS OF W. A. WHITEHEAD, NEWARK, N. J.

FROM JULY 1ST, 1878, TO JULY 1ST, 1879, INCLUSIVE.

Minimum, Maximum and Mean Temperature of each month deduced from full observations of the year ending June 31st, 1879.

MONTHS.	Date.	Minimum.	Date.	Maximum.	Mean.
1878.					
ly	23	60.50	3	98.25	78.25
ugust	26	55.00	9	90.50	73.09
eptember	28	43.75	1	88.00	67.47
ctober	29	35.00	2	96.75	56.41
ovember	15	27.00	12	58.00	42.65
ecember	25	13.50	2	57.75	31.83
1879.					
anuary	3	2.00	28	46.75	25.69
ebruary	15	10.50	26	49.75	27.68
arch	1	16.50	10	63.00	38.42
pril	6	24.50	30	76.25	47.96
ay	3	37.75	31	86.75	63.83
ne	7	48.00	1	93.00	71.55
Mean average year					52.07

From July 1st to December 1st, 1879.

MONTHS.	Date.	Minimum.	Date.	Maximum.	Mean.
ly	20	58.00	16	99.25	75.36
ugust	11	54.00	2	93.00	71.75
ptember	26	38.75	1	86.75	62.45
tober	26	26.50	3	82.00	50.36
ovember	21	17.00	12	71.00	41.76
ecember	—	11.50	—	59.00	35.00

Minimum Pressure of Barometer Monthly, from two observations daily, during the year ending June 30th, 1879.

1878.	
July	30.029
August	29.975
September	30.201
October	30.009
November	29.969
December	30.001
1879.	
January	30.063
February	30.109
March	30.154
April	29.986
May	30.128
June	29.942
Mean average year	30.065

From July 1st, 1879, to December 31st, 1879.

July	30.047
August	30.134
September	30.141
October	30.157
November	30.145
December	30.20

Number of Inches of Snow and Amount of Rain and Melted Snow falling each Month, from July 1st, 1878, to June 30th, 1879.

MONTHS.	Inches Snow.	Inches. Rain & Melted Snow.
1878.		
July	....	4.330
August	....	8.060
September	....	2.535
October	....	2.830
November	....	4.570
December	4.25	7.469
1879.		
January	17.75	2.880
February	1.01	2.530
March	1.75	3.745
April	....	4.760
May	....	2.175
June	....	3.038
Total	24.76	48.932

From July 1st to December 31st, 1879.

MONTHS.	Inches Snow.	Inches. Rain & Melted Snow.
July	....	5.060
August	....	9.120
September	....	3.750
October	....	0.330
November	....	1.940
December	....	7.50

Mean Temperature at Princeton for 1879. *From mean of three observations.*

February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
......	......	......	......	......	64.75	76.25	72.00	65.9	29.9	28.7
......	......	......	......	......	73.00	78.25	76 75	66.0	35.5	37.0
......	......	......	......	......	77.50	81.25	71.75	68.1	29.7	44.4
......	......	......	......	......	77.25	74.00	72.00	56.4	24.5	48.0
......	......	......	......	......	64.37	78.00	76.50	61.6	26.6	38.2
......	......	......	......	......	68.12	77.25	65.75	61.4	32.6	50.4
......	......	......	......	......	68.75	70.25	70.5	60.2	35.0	43.9
......	......	......	......	......	72.50	73.25	61.0	62.9	44.6	41.7
......	......	......	......	......	73.30	61.25	58.0	69.0	50.4	38.4
......	......	......	......	......	73.62	65.00	57.9	65.2	51.5	51.2
......	......	......	......	......	78.87	72.75	57.5	61.2	46.7	45.7
......	......	......	......	......	71.50	70.00	57.0	61.0	60.9	29.1
......	......	......	......	......	79.25	73.50	61.7	64.5	53.6	25.2
......	......	......	......	......	75.12	74.00	54.9	55.2	57.2	37.0
......	......	......	......	......	80.25	70.00	56.1	63.7	61.7	36.0
......	......	......	......	......	80.25	65.25	58.7	67.0	42.7	25.9
......	......	......	......	......	74.37	71.25	57.4	66.1	40.2	33.5
......	......	......	......	......	70.50	64.50	58.5	67.1	38.5	21.5
......	......	......	......	......	69.50	68.25	58.5	49.6	28.6	26.9
......	......	......	......	......	67.62	67.50	55.5	43.2	23.0	32.2
......	......	......	......	......	76.12	70.20	54.5	50.6	16.4	14.9
......	......	......	......	......	78.25	74.20	53.0	59.1	23.0	28.1
......	......	......	......	......	75.37	73.00	59.5	58.9	35.4	20.6
......	......	......	......	......	73.62	71.50	54.0	38.0	27.4	33.7
......	......	......	......	......	72.00	63.75	42.6	30.5	33.1	20.0
......	......	......	......	......	69.50	62.50	46.9	36.0	30.9	9.9
......	......	......	......	......	75.87	61.00	48.5	41.1	37.9	18.6
......	......	......	......	......	78.37	65.00	55.7	42.6	52.7	28.5
......	......	......	......	......	76 87	68.75	56.9	46.7	35.9	36.0
......	......	......	......	......	75.25	70.50	62.4	46.6	23.2	32.7
......	......	......	......	......	76.12	70.75	......	36.2	......	21.4
......	......	......	......	......	73.80	74.16	*56.55	55.54	37.94	32.77
......	......	......	......	......	94.00	90 00	81.5	83.5	72.0	59.5
......	......	......	......	......	57.00	52.00	35.0	21.5	9.5	4.5

twenty-four days only. The omitted days were much hotter the mean. Mean of thirty days, completed from another record, 59.73.

No. 2—Maximum, Minimum and Mean Temperature, with Self Recording Thermometers—Station, Princeton, New Jersey.

DAY OF MONTH.	JULY.		AUGUST.		SEPTEMBER		OCTOBER.		NOVEMBER.		DECEMBER	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	83	59	85	68	81	64	71	55	59	29	38	20
2	80	58	86	70	78	62	80	57	40	27	41	22
3	84	64	88	70	83	65	80	60	46	32	48	28
4	89	68	90	70	83	65	81	54	41	23	54	37
5	92	64	90	67	74	65	81	48	40	20	62	32
6	74	57	96	69	81	55	79	47	40	25	46	40
7	79	58	85	70	78	58	80	57	40	30	59	41
8	81	62	75	65	75	65	70	50	48	31	58	42
9	84	65	78	62	81	53	71	56	55	36	58	24
10	85	64	70	54	77	51	81	64	62	47	46	35
11	87	68	74	52	72	52	78	60	70	49	60	41
12	88	67	77	60	70	51	68	60	53	46	63	36
13	87	63	81	72	71	57	70	53	71	50	42	21
14	83	66	80	64	72	53	78	50	67	48	61	23
15	86	65	83	64	74	49	70	52	63	50	45	24
16	93	72	83	63	57	52	76	55	73	47	47	26
17	94	70	82	62	68	50	80	55	64	36	39	26
18	85	60	74	41	71	58	81	59	55	38	41	21
19	83	69	70	58	70	43	80	56	47	29	35	22
20	80	59	75	59	60	59	79	59	41	29	34	30
21	80	57	78	60	60	43	66	37	37	15	38	20
22	83	58	85	64	62	59	68	36	29	14	25	11
23	86	57	83	68	65	52	65	56	35	19	34	20
24	86	67	85	67	71	55	70	40	47	23	38	29
25	83	66	75	64	68	48	55	29	42	25	40	25
26	80	63	72	57	68	50	53	28	46	25	40	7
27	75	62	68	59	68	50	59	35	45	28	48	8
28	83	67	73	53	68	50	54	38	47	28	29	11
29	86	70	73	57	54	49	60	42	60	45	38	25
30	86	79	79	59	80	57	61	43	45	28	42	31
31	81	68	81	64	....	....	....		....	....	50	11
Range	35°		56°		41°		54°		60°		57°	
Mt'ly means	74°1.		71°		63°		60°.5		41°.3		36°.6	

No. 3—*Barometer reduced to* 32° *F., Princeton,* 1879.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
...	...	...	...	...	...	...	29.542	...	29.962	30.083	30.136
...	...	...	...	...	...	...	29.064	...	29.960	29.932	29.952
...	...	...	...	...	...	29.823	29.707	...	29.786	29.724	29.877
...	...	...	...	...	...	29.660	29.651	...	29.903	30.011	30.003
...	...	...	...	...	...	30.0020	29.612	...	29.852	29.217	30.125
...	...	...	...	...	...	30.082	29.591	...	29.990	30.014	29.642
...	...	...	...	...	...	29.529	29.651	29.758	30.103	30.110	29.652
...	...	...	...	...	...	29.597	29.310	29.645	29.979	30.130	29.913
...	...	...	...	...	...	29.551	29.694	29.823	29.825	29.983	30.189
...	...	...	...	...	...	29.420	29.710	30.002	29.900	30.004	29.903
...	...	...	...	...	...	29.365	29.820	30.079	30.040	29.939	29.029
...	...	...	...	...	...	29.400	29.950	29.965	29.944	29.605	29.991
...	...	...	...	...	...	29.708	29.854	29.782	29.913	29.815	30.375
...	...	...	...	...	...	29.744	29.610	29.722	29.933	29.804	29.873
...	...	...	...	...	...	29.716	29.775	29.901	29.874	29.434	29.500
...	...	...	...	...	...	29.581	29.681	29.688	29.857	29.770	29.825
...	...	...	...	...	...	29.590	29.641	29.730	29.871	30.032	29.812
...	...	...	...	...	...	29.307	29.586	29.905	29.728	29.652	30.120
...	...	...	...	...	...	30.014	29.733	29.961	29.807	29.707	30.037
...	...	...	...	...	...	30.022	30.891	30.034	30.007	29.549	29.812
...	...	...	...	...	...	...	29.870	30.116	29.994	29.912	30.221
...	...	...	...	...	...	29.726	29.641	29.951	29.806	30.011	29.822
...	...	...	...	...	...	29.546	29.522	29.837	29.697	29.727	30.162
...	...	...	...	...	...	29.661	29.378	29.744	29.900	30.008	29.821
...	...	...	...	...	...	29.757	29.515	30.014	30.434	29.914	29.700
...	...	...	...	...	...	29.609	29.669	30.150	30.424	30.201	29.956
...	...	...	...	...	...	29.958	29.766	30.150	29.983	30.112	30.066
...	...	...	...	...	...	29.713	29.849	30.072	29.391	29.722	29.946
...	...	...	...	...	...	29.715	29.777	30.074	29.421	29.700	29.732
...	...	...	...	...	...	29.809	29.748	30.048	29.545	30.241	29.951
...	...	...	...	...	...	29.933	29.747	...	29.879	...	30.063
...	...	...	...	...	...	29.703	29.667	29.923	29.900	29.898	29.920
...	...	...	...	...	...	30.023	30.081	30.202	30.539	30.309	30.387
...	...	...	...	...	...	29.307	29.064	29.608	29.289	29.210	29.413

No. 4—Inches of Rain or Melted Snow, 1879—Princeton, N. J.

Days.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1												
2											0.177	
3												
4							0.84	0.84				
5												
6											0.357	1.100
7									0.170			
8							0.36	1.40	0.167			
9										0.700	0.040	
10												0.013
11											0.010	[illegible]
12												
13												
14									1.150		0.030	1.6[illegible]
15								}				
16								} 5.28				
17								}				
18											0.725	
19										0.130		0.185
20												
21										0.047		
22									0.020	0.050		1.110
23								2.55				
24							0.36		0.023			0.800
25												0.34[illegible]
26							4.18					
27												
28										0.104	0.770	
29											0.040	
30												0.1[illegible]
31												0.21[illegible]
Totals							5.74	10.07	1.530	1.031	2.149	5.[illegible]

No. 5.—Directions of Wind at Princeton, 1879.

JULY.			AUGUST.			SEPTEMBER.		
7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
N. 2	N. 2	S. 1	S. W.	S. W.	S. W.	....	....	....
N. 2	S. W. 1	S. W. 1	S. W.	S.	S. W.	....	....	....
S. W. 1	S. W. 1	S. W. 1	S. W.	S. W.	S. W.	....	....	....
S. W. 1	S. W. 2	S. W. 2	S.	S.	N.	....	....	....
E. 4	S. W. 2	N. E. 1	S. E.	E.	S. E.	....	....	....
S. 1	S. 1	N. 1	S. E.	S. E.	E.	....	E 1	o
S. W. 1	S. W. 2	S. W. 2	S. W.	S.	S. W.	o	S. S. W. 2	S. W. 1
E. 4	S. W. 2	N. E. 1	E.	E.	N.	S. W. 2	W. 3	W. 1
S. 1	S. 1	N. 1	E.	S.	S.	W. N. W. 2	N. W. 1	W. 1
S. W. 1	S. W. 1	S. 1	N. E.	N. E.	S.	N. W. 1	N. 2	o
S. W. 1	S. 1	S. W. 1	N. E.	S.	S.	N. N. E. 1	N. E. 2	½
N. 1	N. 1	N. 1	S.	W.	S. W.	N. E. 1	N. E. 2	N. ½
S. E. 1	S. 1	S. 1	S. E.	S.	W.	S. E. 2	S. E. 2	S. E. 2
S. 1	S. W. 1	S. 1	S. W.	S. W.	S. W.	W. 1	S. W. 2	W. 1
S. W. 1	S. W.	S. W.	W.	S.	S. W.	W. 1	S. S. W. 2	S. ½
S. W.	S. W.	N. W.	S.	S. W.	S. W.	N. E. 2	S. S. W. 1	S. 1
N. W.	S. W.	S. W.	E.	N. E.	N. E.	S. S. W. 3	W. 4	S. W. 1
N.	S. W.	S. W.	S.	S. W.	W.	W. S. W. 2	W. S. W. 2	S. 2
N. 1	E. 1	N. 1	S. E.	S. E.	N. E.	N. W. 2	N. 1	o
S. E. 1	S. W. 1	N. 1	S. E.	S. W.	S. W.	N. E. 2	N. 2	N. 1
S. 1	S. 1	S. W. 1	N. E.	N. E.	S. E.	N. E. 3	N. E. 3	N. E. 3
S. W. 1	W. 1	E. 2	S. W.	W.	S. W.	N. E. 3	N. E. 3	o
S. E. 1	N.	S. W.	S. W.	S.	S.	N. W. 1	S. W. 3	S. W. 1
E.	N.	N.	S. W.	E.	N. E.	S. S. W. 3	N. N. W. 3	N. W. 3
S. E.	S. E.	N. E. 2	N. E.	N.	S. E.	N. 1	N. N. W. 3	o
E. 2	E. 2	N. E.	N.	N. E.	N. E.	N. E. 1	S. E. 1	o
N. E. 1	N. E. 1	S. W.	N. E.	N. E.	N. E.	S. E. 1	S. W. 2	o
S.	S. W.	S. W.	N. E.	N.	S. E.	N. E. ½	S. W. 2	S. E. 2
S. W.	N.	N.	S. W.	N.	N.	o	S. W. 2	(?) 1
S. W.	S. W.	S. W.	N. E.	S. E.	S.	S. W. 1	S. W. 2	S. W. 2
N.	S.	S.	N.	E.	E.	....	....	....

No. 5.—(Concluded.)

OCTOBER.			NOVEMBER.			DECEMBER.		
7 A. M.	2 P. M.	4 P. M.	7 A. M.	2 P. M.	4 P. M.	7 A. M.	2 P. M.	9 P. M.
S. W. 1	W. N. W. 2	W. 1	W. 2	....	o	W. S. W. 1	S. 2	S. 2
o	S. E. 1	S. E. 1	o	S. E. 1	S. E. 2	W. S. W. 2	S. W. 1	S. W. 1
S. 2	W. 3	W. 3	W. 3	W. 4	W. 4	S. S. W. 1	S. W. 2	S. 2
o	....	o	W. N. W. 2	N. W. 3	N. W. 2	W. S. W. 2	N 3	N. 2
o	W. 2	W. 1	o	N. W. 2	N. W. 2	N. E. 3	E. N. E. 3	N. E. 3
o	E. 3	E 3	E. 2	N. 2	o	N. E. 4	....	S. E. 4
N. E. 1	W. S. W. 1	o	N. 1	N. 2	N. 1	N. N. W. 3	W. S. W. 3	W. 2
o	S. W. 3	o	o	S. W. 2	o	Calm.	E. N. E. 3	N. E. 2
S. W. 1	S. W. 1	S. 2	S. 1	S. W. 4	S. W. 3	N. E. 3	E. N. E. 3	S. E. 3
N. E. 2	S. E. 2	E. 2	S. W. 2	N. W. 3	o	E. N. E. 2	S E. 3	S. E. 2
N. E. 3	....	o	N. E. 2	E. N. E. 2	o	S. W. 3	N. W. 3	N. W. 1
o	W. S. W. 3	W. 2	S. W. 2	S. W. 2	S. W. 2	N. W. 3	N. W. 3	N. W. 3
N. W. 3	N. E. 2	N. E. 1	W. N. W. 3	....	....	N. E. 1	S. E. 2	E. 2
N. E. 2	W. S. W. 3	o	....	....	....	E. N. E. 4	N. N. E. 3	N. E. 1
o	N. W. 2	N. W. 1	....	S. W. 4	W. 3	S. W. 2	W. N. W. 4	N. W. 3
N. W. 2	N. W. 2	N. W. 1	W. 2	W. N. W. 5	o	N. W. 4	W. 3	o
o	S. 2	S. 2	W. S. W. 1	W. S. W. 1	o	S. W. 1	N. W. 3	o
S. W. 3	S. W. 3	o	E. 2	N. 3	N. 3	S. E. 1	S. E. 2	S. E. 2
N. W. 3	N. W. 4	N. W. 3	N. W. 3	W. S. W. 2	S. W. 1	N. E. 2	N. N. E. 3	N. E. 2
N. W. 2	W. 2	o	W. N. W. 3	N. W. 5	N. W. 5	o	S. W. 1	S. W. 2
S. W. 1	S. W. 2	o	N. W. 4	N. W. 4	o	N. 3	E. N. E. 3	N. E. 3
o	S. 1	o	o	....	S. 2	N. N. E. 3	N. E. 1	N. E. 1
S. W. 1	N. W. 3	W. 4	S. W. 2	W. S. W. 3	W. 5	N. 1	N. N. E. 1	N. E. 1
N. W. 4	N. W. 4	....	W. N. W. 3	N. W. 3	S. 2	N. 1	S. S. W. 2	S. S. W. 2
....	....	o	S. 2	S. W. 3	W. 1	N. N. E. 2	N. 2	W. 3
o	S. W. 3	S. W. 2	N. W. 1	N. W. 2	N. 1	N. W. 2	W. 3	N. N. W. 3
S. W. 1	S. W. 3	S. W. 1	N. N. E. 1	S. 2	S. W. 1	W. 3	S. W. 3	S. W. 2
N. E. 1	N. W. 5	N. W. 3	S. S. W. 1	S. 3	S. E. 4	S. 2	S. W. 2	S. E. 1
S. W. 2	W. S. W. 3	W. 1	N. W. 4	W. N. W. 5	W. N. W. 4	W. S. W. 1	S. W. 1	S. S. W. 1
W. 2	N. W. 5	N. W. 2	W. N. W. 4	N. W. 4	o	S. W. 1	N. W. 3	N. 3
W. N. W. 4	N. W. 4	N. W. 3	....	....	....	N. E. 3	N. E. 1	N. W. 4

Summary of Observations by J. Ingram, M. D., at Vineland, N. J.

YEAR 1878 TO 1879.	TEMPERATURE.			MOISTURE.			BAROMETER.				WINDS FROM JULY 1878 TO JULY 1879.								
	Max.	Min.	Mean.	Hydrogen.	Rainy Days.	Rain.	Max.	Min.	Mean.	Range.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.
July	96	66	77.99	80	9	6.42	29.989	29.488	29.786	.501	6	13	3	18	7	33	0	13	93
August	92	57	73.16	82	10	8.46	30.020	29.551	29.780	.469	2	23	2	19	6	27	2	12	93
September	86	42	67.98	80	5	.69	30.294	29.520	29.985	.774	10	21	2	11	6	27	0	13	90
October	78	32	56.24	76	7	2.18	30.135	29.016	29.887	1.119	6	6	1	9	5	28	11	27	93
November	61	23	42.96	79	7	2.25	30.317	28.820	29.813	1.497	4	12	4	8	1	23	9	21	90
December	60	9	31.76	67	9	5.69	30.313	28.656	29.834	1.657	0	2	2	7	1	30	5	46	93
January	63	4	28.92	68	6	3.75	30.363	29.285	29.903	1.078	5	9	1	1	2	33	14	28	93
February	58	7	29.55	71	6	2.38	30.600	29.305	29.891	1.295	5	8	1	7	4	17	8	34	84
March	68	18	41.01	82	10	3.36	30.514	29.294	29.964	1.220	8	4	1	8	8	29	4	31	93
April	83	30	48.33	80	9	3.47	30.238	29.296	29.758	.942	9	4	2	8	8	18	7	33	90
May	92	46	63.39	74	4	.77	30.288	29.666	29.908	.622	6	8	4	15	5	39	0	16	93
June	94	44	73.29	78	9	4.90	30.091	29.358	29.831	.733	5	2	0	10	3	52	2	16	90
						44.32													
Means	77.6	31.1	52.88	76	7.5	3.7	30.263	29.271	29.861	.992	5.5	9.3	2.0	10.0	4.7	28.6	5.1	24.1	

No. 4.—*Meteorological Report for* 1879.

eter highest August 3d	95°
eter lowest January 3d	4° below 0

on ninety-four days; Snowed twenty-four times; nineteen thunder showers; fourteen fogs; thirty-; hailed four times.
ost, September 26; first ice, October 29; †first snow, October 24.
of rain fallen:

	INCHES.
	2.70
	2.30
	5.06
	5.80
	1.50
	8.85
	4.31
	9.23
r	1.42
	0.47
	2.13
	6.42
	50.18

of snow fallen:

	INCHES.
	12
	10
	2
	7
	31

sts since.
es since.

E. R. COOK,
Observer Chief Signal Service.

VITAL STATISTICS.

ıited Acts Concerning the Registry and Returns of Marriages, Births and Deaths as now in force.

1. Be it enacted *by the Senate and General Assembly of the ıte of New Jersey,* That every minister of the gospel, justice of e peace, and other person having authority to solemnize mar-ıges, and the clerk or keeper of the minutes of every religious ciety in this State, before which any marriage shall be solemn-d, shall transmit to the proper officer, as hereinafter desig-ted, a certificate of every particular marriage solemnized be-e him, within thirty days thereafter, which certificate shall ow the name, age, parentage, birthplace, occupation and resi-nce of the parties married, the time and place of the marriage, e condition of each of the parties, whether single or widowed, e name of the clergyman or magistrate officiating, and the mes and residences of the witnesses; any clergyman or magis-ıte neglecting to send such certificate shall be liable to a pen-y of ten dollars.

2. *And be it enacted,* That it shall be the duty of the physician, dwife, or other person present at the birth of every child born, d in case there be no physician or midwife present, it shall the duty of the parent to report in writing to the proper icer within thirty days thereafter the following particulars as as known: the day of the month and year of the birth, the ecise place of residence, the names of both parents, and the ıiden name of the mother, the birthplace, residence and occu-tion of the parents, the sex and color of the child, and its me, if it be named, also the name of the attending physician, der a penalty of thirty dollars; *and it is also provided,* that any sessor of a township at the time of his annual assessment, in se he finds any return of birth not made as herein provided, ıy fill out the certificate of the same on the usual blank signed

by himself as assessor and maked "special return," and said return shall be valid as record of the birth, but shall not excuse the attendant for neglect of return.

3. *And be it enacted,* That no sexton, undertaker or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided,* that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died, shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted,* That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness, to furnish the undertaker, or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death and the cause of death, according to the best of his knowledge, and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided,* that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died, and in case there has been no physician in attendance, some member of the family, if there be any present, if not, any one present, shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of

ath, grant the township certificate for burial, and, if not satisd, shall send at once for the county coroner, or county physian, or justice of the peace, who shall take charge of the body id investigate the same, and, if any person present at the death any person shall refuse or neglect to comply with the requireents of this act, they shall be liable to a penalty of ten dollars, id the physician shall receive one dollar for viewing a dead dy and granting a burial certificate, provided said physician s not been in regular attendance on the deceased, if so, no tra charge shall be made by said physician.

5. *And be it enacted*, That in any case where, on account of e absence of the proper officer, or for any other sufficient rean, it may be impossible to obtain from said officer a permit time for burial, it shall be lawful for any judge of the court common pleas or any justice of the peace of the county in which e person died, on being satisfied as to the correctness of said tificate, to issue a permit for burial in the following form: It being impossible to obtain a burial permit from the proper ficer on account of (here stating the reason) I hereby grant this ecial permit for the burial of ——— whose death has been ly certified to me;" the said judge or justice of the peace shall once copy upon the back of said certificate the permit as anted, and mail the same to the office of the Secretary of ate at Trenton, marked on the envelope "Burial Permit;" and e undertaker or other person on the receipt of said special perit, shall pay to the said judge or justice, granting the same, e sum of fifteen cents.

6. *And be it enacted*, That any person who shall knowingly ake any false certificate, statement or receipt, relative to any arriage, birth or death, under the action of this law, shall be lged guilty of a misdemeanor, and on conviction shall be nished by fine or imprisonment, or both, at the discretion of e court.

7. *And be it enacted*, That the proper officer to receive the cercates of marriages, births and deaths, and to grant permits burial, shall, in any incorporated city or borough, be the city rk or other officer charged with these duties, and in any inty having a similar officer appointed by a county board of alth now organized, be such person or persons as said incorpoed city or county board of health has authorized or may

authorize, and in townships the assessor, but in townships side of city or corporate, or county health board limits burial certificate given by any regularly graduated phys shall constitute the burial permit as herein provided.

8. *And be it enacted*, That it shall be the duty of all asse clerks and other officers to transmit, on or before the 15tl of each calendar month, to the Secretary of State at Trent an envelope or package marked "vital statistics," all the c cates of marriages, births and deaths as above described, rec during the preceding month, or at such other intervals or p as may be designated by the Secretary of State.

9. *And be it enacted*, That it shall be the duty of such ass clerks and other officers, to make and keep a complete list, as possible, of all coroners, physicians, midwives, undert clergymen and other persons authorized to solemnize marr and on or about the first day of May, in each year, to se each a printed copy of the sections of this act defining respective duties, and to furnish them, on application, wit proper blanks to make the prescribed returns.

10. *And be it enacted*, That such assessor, clerk or other o upon receiving a certificate from the Secretary of State as whole number of marriages, births and deaths returned as said, shall be entitled to receive from the collector of the ship or other proper disbursing officer, ten cents for each riage, birth or death so returned, the receipt for which sh attached to the said certificate, and no payment shall be unless such certificate be produced.

11. *And be it enacted*, That the Secretary of State shall ap on the nomination of the State Board of Health, of which a member, a suitable person, who shall be a practicing phy of at least ten years' standing, who shall receive the r made in pursuance of this act, examine carefully and pr under the direction of the State Board of Health, such t statements, results and deductions therefrom as bear upc population, the causes and sources of disease, and the sour special progress and deterioration, and make an annual thereof to the State Board of Health, which report shall b lished as a part of the annual report of said Board; it sha be the duty of the said person to prepare and issue to ass clerks and other officers the blank forms of certificates a

turns required by this law, and the printed sections of the law required to be distributed to physicians, clergymen, undertakers, and other persons, and he shall accompany the same with such instructions and explanations as may be necessary and useful, and shall do whatever may be required to carry into effect the provisions of this act; the Secretary of State shall, as now authorized, furnish the above and other blank forms that may be required for issue on application or otherwise, but the failure to have received such blanks unless there has been application therefor, shall not be any excuse for the disregard of the law.

12. *And be it enacted,* That at the publication of the report of Vital Statistics, the superintendent thereof shall have caused all returns of marriages, births and deaths for the year to which the report relates to be arranged and alphabetically indexed, keeping each class of marriages, births and deaths distinct and separate, and also the index and returns for each county and for all cities of over five thousand inhabitants within said county; and the same shall be kept on file with the archives of the office of the Secretary of State, and for the clerical service needed the Comptroller is authorized to pay the same amount as is now provided to be paid to county clerks for the same service, payable on the order of the Secretary of State; and in the case of any county now having a county board of health, or of any city of over thirty thousand inhabitants, the clerk of said county or of the city board shall also keep an indexed registry, and shall receive from the proper authorities of said county or city an amount for each name so registered equal to that heretofore allowed for such index and registry.

13. *And be it enacted,* That the person appointed to take charge of the certificates of marriages, births and deaths, and to prepare the report on vital statistics, shall be paid for his services such sum as may be fixed by the State Board of Health; *provided,* that he be paid out of the moneys appropriated for the use of said board; *and provided further,* that the entire amount to be expended by said board shall not exceed two thousand dollars annually, and so much of said amount as the Board of Health may require shall be payable by the Comptroller on account rendered and signed by the president and secretary of the board, and approved by the Governor.

14. *And be it enacted,* That the State Board of Health shall have the same power of enquiry as to vital statistics, and as to other matters relating to public health in all cities and counties of the State having city or county boards of health as they have in other parts of the State; *provided,* that in no case shall the enquiries interfere with the present authority of city or county boards of health, nor shall the State Board of Health exercise any jurisdiction over such city or county boards.

15. *And be it enacted,* That in case any of the persons designated in this law to make or transmit returns shall fail so to do, they shall be liable at suit at common law to the amounts heretofore named, but said suit must be brought by a State, city or township board of health, or township committee in the State, and one-half of the amount recovered shall be paid to the usual disbursing officer of the city or township, and the rest shall belong to the board or committee bringing the action.

Explanations of parts of the Act as to Marriage, Birth and Death Returns.

Copy of sections of the law defining the duties of Clergymen, Coroners, Physicians, Midwives, Undertakers, etc.

1. Be it enacted *by the Senate and General Assembly of the State of New Jersey,* That every minister of the gospel, justice of peace, and other person having authority to solemnize marriages, and the clerk or keeper of the minutes of every religious society in this State, before which any marriage shall be solemnized, shall transmit to the proper officer, as hereinafter designated, a certificate of every particular marriage solemnized before him, within thirty days thereafter, which certificate shall show the name, age, parentage, birthplace, occupation and residence of the parties married, the time and place of the marriage, the condition of each of the parties, whether single or widowed, the name of the clergyman or magistrate officiating, and the names and residences of the witnesses; any clergyman or magistrate neglecting to send such certificate shall be liable to a penalty of ten dollars.

Neglect on the part of those solemnizing marriage to report the same, not only incurs the penalty, but often causes great inconveniences in securing evidence as to questions of legal validity. It is the right of each married person to have this recorded evidence, besides the need of these returns in the study of conditions, and of the moral as well as the civic welfere of society. Those in charge of the various religious bodies at their annual, semi-annual or quarterly meetings should not fail to cal attention to this duty of monthly report, and to the breach of law and ethics which the oversight involves.

2. *And be it enacted*, That it shall be the duty of the physician, midwife, or other person present at the birth of every child born, and in case there be no physician or midwife present, it shall be the duty of the parent to report in writing to the proper officer, within thirty days thereafter, the following particulars, as far as known: The day of the month and year of the birth, the precise place of residence, the names of both parents, and the maiden name of the mother, the birthplace, residence and occupation of the parents, the sex and color of the child, and its name, if it be named, also the name of the attending physician, under a penalty of thirty dollars, *and it is also provided*, that any assessor of a township at the time of his annual assessment, in case he finds any return of a birth not made as herein provided, may fill out the certificate of the same on the usual blank signed by himself, as assessor, and marked "special return," and said return shall be valid as a record of the birth, but shall not excuse the attendant for neglect of return.

The decisions of the medical profession (see English Registrar General and Privy Council Reports and articles on Vital Statistics, Vols. I. and II., Report of New Jersey State Board of Health, and Transactions of Medical Society of New Jersey, 1878,) authenticate it as a part of our duty to make these reports, besides the obligation which law and the general interests of society imposes. If Physicians will carry a few blanks in the pocket case or the visiting record, there is but little inconvenence. The fact that in townships the assessor is allowed to make special return in neglected cases will not be allowed to take the place of the requirement of return from the attendant, but it is used as the means of informing the Bureau of Vital Statistics of

any cases of neglect of return. Assessors should inform those concerned of the penalty for such neglect.

3. *And be it enacted*, That no sexton, undertaker, or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided*, that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died, shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted*, That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness, to furnish the undertaker or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death, and cause of death according to the best of his knowledge; and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided*, that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died, *and in case there has been no physiciau in attendance*, some member of the family, if there be any present, if not, any one present, shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the township certificate for burial, and, if not satisfied, shall send at once for

he county coroner, or county physician, or justice of the peace who shall take charge of the body and investigate the same, and if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting a burial certificate, provided said physician has not been in regular attendance on the deceased, if so, no extra charge shall be made by said physician.

5. *And be it enacted,* That in any case where, on account of the absence of the proper officer, or for any other sufficient reason, it may be impossible to obtain from said officer a permit in time for burial, it shall be lawful for any judge of the Court of Common Pleas or any justice of the peace of the county in which the person died, on being satisfied as to the correctness of said certificate, to issue a permit for burial in the following form: "It being impossible to obtain a burial permit from the proper officer, on account of (here stating the reason), I hereby grant this special permit for the burial of———,whose death has been duly certified to me;" the said judge or justice of the peace shall at once copy upon the back of said certificate the permit as granted, and mail the same to the office of the Secretary of State at Trenton, marked on the envelope "Burial Permit;" and the undertaker or other person on the receipt of said special permit shall pay to the said judge or justice, granting the same, the sum of fifteen cents.

6. *And be it enacted,* That any person who shall knowingly make any false certificate, statement or receipt, relative to any marriage, birth or death, under the action of this law, shall be judged guilty of a misdemeanor, and on conviction, shall be punished by fine or imprisonment or both, at the discretion of the court.

7. *And be it enacted,* That the proper officer to receive the certificates of marriages, births and deaths, and to grant permits for burial, shall, in any incorporated city or borough be the city clerk or other officer charged with these duties, and in any county having a similar officer appointed by a county board of health now organized, be such person or persons as said incorporated city or county board of health has authorized or may authorize, and in townships the assessor, but in townships out-

side of city or incorporate, or county health board limits, the burial certificate given by any regularly graduated physician shall constitute the burial permit as herein provided.

These sections are so explicit as only to need enforcement rather than explanation. The burial of a person in this State without certificate or permit, or the failure of a person in charge of a burial to return the same according to the city law or according to this law as provided in townships, is so hazardous that it is not likely to occur. There is only need to ask of physicians and others in making out certificates that they be as exact and full as possible in the statement of facts and that the returns of cause of death be such as the Leaflet to Physicians indicates. Such terms as general debility, dropsy, old age, sore throat, etc., are rarely defensible. On the other hand, cholera, typhus and typhoid fever, diphtheria, cerebro-spinal meningitis, should not be attached as names unless the specific character is clear.

In the interests of public health it is often well for the physician to state how prevalent the disease is at that time, if it is at all endemic or epidemic, and to note on the back of any certificate the prevalence of any disease which has been so mild as not to cause death. No physician should report a disease prevalent in his own practice unless he has had at least ten cases during the month.

In case of death, physicians will save undertakers trouble by leaving the certificate at the house of the deceased, or by having it ready at their own offices, so that it may be had when called for in their absence.

When in case of sudden death for which a physician finds he can not give certificate, a coroner or county physician, or a justice of the peace acting as coroner, is called, said officer gives the certificate of death as would the physician in other cases, and signs his official title.

NOTE TO CITY CLERKS AND ASSESSORS.

This copy of the printed sections of the act, etc., may be sent at any time by assessors or city clerks to any persons neglecting their duties under the law, or to any new physicians or ministers, etc., moving within their bounds. None, however, can plead

ignorance of the law from not having received such special reminder. The names of physicians, ministers, undertakers, and all required to make returns, should be kept by each assessor or city clerk in a small book, or we will, on request, furnish blank sheets for them. This Bureau should be notified especially as to changes of physicians and undertakers.

Assessors and city clerks will send on the 15th of each month the certificates up to the 1st of the month, and place on the outside of the envelope, by number and initials, how many are sent, so as to compare accounts. When an Assessor goes out of office he should include in his monthly return all certificates in hand at that time, together with the name and address of his successor. As the time of administering oaths to officers after the March elections varies from the middle of March to April, we close the fiscal year so soon as returns up to April 1st are received. All clerks of incorporated cities may have their receipt for returns twice per year if they prefer.

CIRCULAR TO ASSESSORS, TOWN CLERKS, ETC.

Some important changes in the law as to the Registry of Marriages, Births and Deaths, make it necessary to issue this circular.

I. There has been no change in the law as to the return of Marriages. These are to be made to the assessor or city clerk in the township or city or borough where the marriage took place, and on the forms provided, as they are for permanent preservation. In Hudson county all returns of Vital Statistics are made to the County Board of Health.

II. There has been no change in the law as to return of Births, except that the penalty of non-report is increased to thirty dollars, and the assessor, in his annual assessment, is to fill out a certificate of birth, marked special in any case where over a month has elapsed without report. This return names the attendant, and so shows where there has been neglect, but

does not excuse the attendant for non-report. Still-Births (under the same provision. It is impossible to compute meaning of the death rate unless studied by the side of birth rate. The law has been fully sustained, and all now cautioned against the penalty for neglect.

III. The law as to the modes of giving and obtai Certificates of Death and Permits of Burial remains the in cases of death within the corporate limits of any city, or borough of the State. When the death occurs in township outside the corporate limits of a city or of a Co Board of Health, the Certificate of Death of any regu graduated physician answers as the Burial Permit; bu undertaker or person in charge of the burial must, unc penalty of fifty dollars, within five days of the date of b send the same, by mail or otherwise, to the assessor of township in which the deceased died.

Or if the undertaker himself resides in a city or incorpo town, he may present the certificate of death in *case of burial* he is superintending to the city clerk or other p officer of said city, and receive the usual permit as issu the city clerk, whereupon the clerk at once for him tran the certificate of death to the assessor of the townsh which the deceased died.

IV. Where a person who has died in a township outsi a city is to be buried out of the State, it is best to exch the Certificate of Death for the usual State or Transit Pe as we cannot compel other States to accept a Certificate of I as a permit. It is well for all assessors to have on hand Pe to exchange for Certificates of Death when asked. Adj States accept *our* Transit Permit, and Pennsylvania accept usual State Permit. The Certificate of Death is never given up by the undertakers or persons in charge, to the se or keeper of a cemetery but where such have a registry, a may be taken, or a certificate marked "Duplicate" be left the keeper of the cemetery. There may be special requirer of city ordinances where the burial is within the corp limits of a city.

Cases of disinterment and re-burial should be dealt with as burials, and have in cities a permit, and in townships a Physician's Certificate, giving name and year or month of the decease.

V. Where a body is brought from another State for burial in this State, outside of City or County Board limits, the Burial Certificate is the warrant for burial, but must be transmitted by the undertaker within five days, to the assessor of the township in which the burial takes place, and if brought within city limits, must conform to the regulations for the city. If the undertaker resides out of the State, the law would hold the sexton or other person in the State providing the place for burial as obligated to see that the certificate is duly sent. Where a body is brought into the State without either Death Certificate or its own State Permit, the mode of procedure is the same as where no physician has been in attendance.

VI. Where there has been no physician in attendance, "some member of the family, if there be any present, if not any one present, shall notify a physician of the death, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the Certificate, and, if not satisfied, shall send at once for the county coroner, or county physician, or justice of the peace, who shall take charge of the body and investigate the same, and, if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting the Certificate, providing said physician has not been in regular attendance on the deceased; if so, no extra charge shall be made by said physician."

In the case of a body brought from another State without Certificate of Death or Burial Permit, the charge of one dollar for issuing the Certificate is to be paid by the undertaker or person in charge; where the person has died in the State, the physician who views the body and issues the Certificate, or refers the case to the coroner or county physician, is entitled to receive one dollar from the county collector, if he has not received pay from the family or friends of the deceased.

VII. The allowance to those who receive and transmit certificates has been increased to ten cents. This includes the duty of transmitting such death certificates as belong to townships and have been given to city clerks to their respective assessors without remuneration. This increase of allowance is intended to result in a close oversight on the part of assessors and clerks for securing full returns. Success depends as much upon the officers as upon the facility of the law itself. It is not now meant that assessors and city clerks shall be merely receivers, but that they shall each in their way studiously aim that no marriage, birth or death shall occur without return in due form. Neglects reported to the Secretary's office will receive exact attention. It is the well determined policy of the State to make its statistics of reliable value both as records and as pointing out the social condition of the people and the cause of disease and death. The new law has operated encouragingly, but now that its inconvenient points have been adjusted and its force increased, there must be insistance upon exactness in all returns.

As the allowance for returns has been changed, accounts will be made up to date of April 1st. The receipts and orders for payment will be sent as promptly as returns are received in April, and the amount will be due on presentation to the disbursing officer of the cities or townships.

When there is any change of assessor or clerk the outgoing officer should make over all blanks, books of instructions, circulars, etc., on the day that he retires from office, and send us the name and post office address of his successor, whereupon the account due will be made out and sent within the month, instead of waiting until the close of the fiscal year. The new assessor or city clerk should at once inform us by postal how many blanks of each kind the former officer has made over, and how many more of each kind he thinks he needs.

VIII. While care should be taken that blanks be always on hand and are supplied to all, generally as done up in tens, yet clerks and assessors should see that the returns made nearly correspond in number with the blanks given out. In mailing, returns should be folded carefully, as they are kept on file. It is best, as far as possible, to send on the 15th of each month

y those of the previous month, except where an assessor is king his last return. It is also best to mark on the outside of envelope of each package the number sent, M., B., D. and 3., showing the divisions of each.

X. We have now a list of all Clergymen, Physicians, Under-ers, etc., in the State. City clerks and assessors will please ort especially medical changes. They should compare their irns at least every three months with their lists to know if re are any omissions of return. When any physician in full ctice has made no birth return for three months, the fact uld be stated to this office. In April of each year, in accord n section 9 of the law, all lists should be reviewed, and such ces as are needed be sent.

. Hereafter applications for blanks should be sent by postal, ected "State Vital Statistics," Trenton. The book of in-ctions, or Leaflets, will be sent to Clergymen, Physicians, lertakers, etc., on similar application by postal, or through assessors and city clerks.

CIRCULAR.

TRENTON, N. J., 1878–9.

'he enactment of a new State law as to the registry of Mar-ges, Births and Deaths, affords a good opportunity to secure ater accuracy of returns everywhere, and for cities to enforce r own local requirements in addition. These records have ome so important in furnishing information as to the progress States, the condition of the people, and the needs of sanitary ervision, and so help to guard against careless dealing with sick or dead, that all countries now insist upon their careful ection and study. Ii is found that all such laws depend for ctive working very much upon the person who, in any city listrict, superintends the returns. If he keeps the names of gymen, Physicians, etc., and each month examines his re-is, he will soon be able to detect any failures of report. With return made August 15th, 1878, all City Clerks are requested

to send a list of all practising Physicians or Midwives who *live* within the city limits, and all Assessors to furnish a similar list of such in their respective townships, with the post office address of each person. The list should, as far as possible, designate the sect of practice; those of the Old or so-called Allopathic School being marked (A), those of the Eclectic (E), those of the Homœopathic (H), and Midwives (M). We may thus know whether those signing their names to Birth and Death Certificates have somewhere received education or license.

The names and post office address of all *Undertakers* in your city or township are also desired. Returns made to the Secretary of State will be carefully compared, so as to find out any failures of duty, and cases of omissions be recorded for investigation. All Clerks and Assessors are requested to make prompt return on the fifteenth day of each month, and to report any case of Burial without Permit, or any other case of delinquency in their District, to the Secretary of State, Trenton, N. J., or to E. M. Hunt, M. D., as by his direction, having the oversight of State Vital Statistics.

CIRCULAR TO TOWN CLERKS AND ASSESSORS.

TRENTON, October, 1879.

The experience of the Bureau of Vital Statistics has now extended over a sufficient length of time to enable us to judge of the success of present methods, and the cause of variations that may occur in the completion of returns. Incidents connected with the change in the law, the small compensation at first allowed to assessors, and the inconvenience of the first law in rural districts, occasioned some embarrassment. But since the improvement made in the law by the last Legislature, these difficulties have vanished. The aggregate number of Marriage, Birth and Death returns for the year ending July 1st, 1879, is an increase of about 13,000 over the previous year. As we come to compare the fuller returns in the different districts, it is apparent that where assessors are faithful in reminding the tardy, and requiring from all compliance with the law, full returns are secured.

It will always occur that some are negligent in making their reports. It is now the duty of all assessors and town clerks, at least each three months, to closely note those who fail to make returns, or whom they have reason to believe overlook some. When this is done full returns are obtained. In cases of continued dereliction, we have not failed in a single case reported to us to secure the returns. Already good effects are apparent in tracing the causes and localities of disease. It only needs faithfulness on the part of assessors to make this census of vital condition more complete than any other census which is taken. We now ask each assessor and town clerk to be diligent in securing returns, where there is any neglect, and to report to the Secretary of State and Bureau of Vital Statistics any persons who neglect their duty. The law is imperative and the duties explicit.

"Modern sanitary science owes its existence to the registration of deaths, and the localization thereby of unsanitary conditions." Alongside of it we need to study the marriage and birth returns as showing the proportion of material, the circumstances, ages and conditions with which disease is dealing. No city or township can properly guard its population or lessen the avoidable burdens of insalubrity which sicken and destroy its inhabitants without a study of such statistics. In large cities it is indispensable that street by street or other areas of locality be studied and compared. The English reports teem with records of such inquiries, and with the details of methods by which the people have been delivered from some of the most serious embarrassments to health and life. We urge each assessor and town clerk to restudy carefully the directions already given—to secure full reports from each clergyman, physician, etc., and in a thorough, business way to aid us in the perfecting of these returns.

By order of Bureau of Vital Statistics.

CIRCULAR AS TO SANITARY ORGANIZATIONS IN CITIES.

To the Mayor and Common Council of your city:

New Jersey has about fifty incorporated towns and cities, including over 600,000 inhabitants, the entire population of the State being a little over one million. Other towns not incorpo-

rated, such as Vineland, Flemington, Somerville, etc., contain about 50,000. According to the census of 1875 in an area of 70 square miles there are 307,363 inhabitants, or nearly one-third of the people of the State. The geographical position of our State necessitates that masses of people congregate in chosen centres. The relations of tide water also bring the cities in close neighborhood to each other. We cannot thus mass population without certain incidents and associations unfavorable to health and long life. The comparison of the average death rate of city and country, and that of cities among themselves, shows the actual facts as to the perils, and also how far they may be obviated or diminished by sanitary methods. There are no health lessons more valuable than such as are to be learned by the study of those English cities in which sanitary measures have sensibly prolonged the lives and improved the health of the people. Sickness and death are more expensive to towns and more personally depressing than are such expenditures as are really demanded for their prevention, if these are made with intelligent and honest jurisdiction. The greatest expense is generally in undoing what ought never to have been done, or in imperative changes after a locality has been builded upon. Many of our cities are now accumulating evils which wise forethought and a little expense would easily avoid, while afterthought and depressing disease and taxation will create the real burden. If before doing we find out just what needs to be done and how to do it, leaving the *when* as a measure to be decided on with all the facts in view, there is seldom unwise or burdensome expenditure. Cities will be disease resorts until they are made health resorts. The questions for the citizens and for their official representatives, are simply these:

What ought to be the health condition of the town?

What are its natural sources of ill-health?

What are its artificial sources?

How can these be prevented from increasing?

How can real evils be abated?

It is not difficult to obtain important preliminary information. In the inquiry itself good enough is done to pay for the time and trouble, even if we are not able at once to abate recognized evils. The first step toward reform is a sense of its necessity. We have sometimes to pause long, but nothing is lost by the

first step. The State is helping in this direction through the Bureau of Vital Statistics. It is now possible to learn what the actual death rate is, what proportion it bears to the birth rate, and to the population, what ages are most affected, and what local causes show their effects in registry of death and in the prevalence of disease at any one spot. The geology of our State is so defined that it is an easy matter to determine the ground work of our cities. The sources of, and the risks from, impurities are not difficult to discover. What constitutes a healthy dwelling and what are the deviations therefrom to be found in cities or parts of them can be ascertained.

Where children or operatives are assembled for daily work, we should know whether there are avoidable evils risking health or embarrassing labor. The great present need of most of our cities is not expense, but some well devised steady inquiry—a recognition of its importance, and some simple, definite plan of fact-gathering. Every city should have its Health Board of not less than five members. These should not be chosen politically, but with reference to fitness for sanitary inquiry into the causes which favorably or unfavorafily affect the public health. The Mayor and City Physician should be, ex-officio, members of the Board. Surveyors and City Clerks and School Trustees are often of service with other members. It is not difficult to select in each city those who by judicious examination could give valuable information as to local causes of disease. Some of our cities have no Health Boards at all. In some there are Boards without power.

With expenditures limited within fifty or a hundred dollars, many such Boards could gather facts which all the citizens should know, and which would prevent increase of sickness by precautions, where they could not at once abate nuisances. Here and there a city is doing valuable work. We know a few cities in which voluntary associations have accomplished so much as to have been of great service.

The Health Board of the State has, as one of its duties, to cooperate with all localities in such inquiries.

We respectfully ask that you make of your Health Board something more than a name, if at present it is merely this, and that you place yourselves in such correspondence with us as that there may be mutual aid in securing the welfare of our citizens.

These interests have to do with the material prosperity of you: city far more than some imagine. The time has come when in telligent persons, seeking settlement and business, inquire as t the sanitary administration of the place. The City Clerk in hi next report of Vital Statistics is requested to send the names o the Mayor and of the Board of Health of the city, and always t send any report made by the Board or any facts as to sanitar conditions.

Any careful series of questions asked by any Boards will re ceive due attention from the State Board of Health and th Bureau of Vital Statistics. We ask that this matter be brough before your Council at its next meeting and that your Board o Health be so strengthened as to secure effective inquiry.

EZRA M. HUNT,

Secretary of State Board of Health, Medical Supt. of S. V. S.

TRENTON, N. J.

ᴙEPORT OF THE MEDICAL SUPERINTENDENT OF STATE VITAL STATISTICS.

Vital Statistics are important because they are the record of ıe vital conditions of population. They afford the data with hich we must be acquainted in order to plan for the future ɜvelopment of the social and material resources of a State. If ıey present facts not in accord with true progress or a higher vilization, we are thereby led to inquire into causes of failure and study how, in the future, to abate or control whatever may be und to have interfered with the highest welfare of the whole ɜople. Governments long since found that as preparative to ɜfence in times of war, they must seek an accurate acquaint-ıce with the physical conditions of their subjects. A standing ·my, selecting the strongest men, and, by military discipline, de-·loping all their physical resources, might seem, in part, to pre-ude the necessity of special care for the remainder. The Euro-ɜan nations have not so thought, and surely a nation depending rgely on a citizen soldiery could not so reason.

Modern and Republican statesmanship has taken a higher and ·oader view in that it has come to estimate the real strength of people, by the capacity of a nation in peace; by the gor which it can infuse into trade, commerce and the arts, and ʳ an effort to secure that endurance, of which a sustained in-ıstry is the happy token. It affords a base of supply which ten prevents the occurrence of war, and, if it comes, gives the ɜst assurance of victory. Social science is now distinctly recog-ized as an indispensable department of Political Economy. It ɪs no more important division than that which concerns the ɜalth and the life of the people. The common health is so uch the common wealth as to restore to the two words their rmer identity of meaning.

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events of marriage, birth and death which so concern national as well as individual life.

Our greater need is to study the best methods of securing the returns, and then how to deal with the facts acquired in such a manner as to deduce from them correct conclusions, such as shall indicate avoidable errors on the one hand, and true methods for progress on the other.

It is fortunate that we do not enter upon an untried or experimental field of inquiry. Statistical inquiries conducted by methods such as belong to science and the arts, have been pursued by many governments as parts of their economic administration, and have commanded the devoted attention of many of the ablest minds of the age. Speaking of one class of such records Farr, the statiscian says, "The deaths and causes of death are scientific facts which admit of numerical analysis. Science has nothing to offer more inviting than a study of the influence of civilization, occupation, locality, seasons and other physical agencies either in generating disease or producing death, or in improving the public health." After twenty-one years of registry, he says, "We have now before us the results of observations in a certain class of phenomena. They are as valuable as the experimental philosopher could have deduced from his experiments if he had had the power to expose the population to great vicissitudes of heat and cold, of dampness and dryness, to changes incidental to differences in the price of food; to air and water in different degrees of impurity, and to destructive epidemics." "Organized bodies are governed by laws as fixed as those which govern the stars in their courses."

Beneke, the statiscian of the German government, has said "mortality statistics are the basis of public as well as private care of health. Every step forward in this direction is a gain to human working-power and welfare." Our American statist, DeBow, generalized the accepted fact when he said: "The experience of all countries preserving such records shows a marked amelioration of society, diminution of disease, and extension of the average period of human life."

As to the method of obtaining the most correct returns on leading points, there is, on the part of those who have used various plans and had the largest experience, a unanimity of

judgment quite in contrast with the varied and speculative suggestions of those who have not studied this subject as they have the details of their own chosen occupation.

First of all it is found that the record of an event is most accurately obtained from the person specially in charge at the time and at a period of time not remote from the occurrence. Punctual and careful men are apt to think that occasional reports in bulk would do, while those who lay chief stress on the fact of a marriage, or birth, or a death, rather than upon vital inquiries connected therewith, do not object to an annual collector whose returns are capable of no satisfactory analysis.

Second, returns are chiefly of value when gathered over large areas and from a large population admitting of comparisons as to city and county, as to locality and climate, as to age and circumstances, and other modifying or governing circumstances. It is only thus that hasty generalizations from an insufficient number of facts are avoided, and errors eliminated, which, in a small comparison would be formidable or unaccountable. The general government now deems it wise to attempt this at its decennial census for the whole country.

When our present law commenced operation, it might be fairly asked whether returns could be secured from the whole State with the same accuracy as from a single county, even though it would be readily granted that if they could the comparisons would eventually be of far greater importance. Experience has fully settled this point. There has been little difficulty in securing the returns. Delays have occurred more in cities that had become accustomed to neglect a local registry law, than in those that never had one, or than in sparse localities.

It will be seen that with all the temporary embarrassment consequent upon any change, and then upon a subsequent modification, the aggregate of returns exceeds by over 13,000 those of the former year.

New Jersey represents a population of little over a million, or about the population of New York City. By the facilities of present postal intercourse we are easily able to bring together monthly returns, and in the end to secure all the advantages afforded by a comparison of all the returns for the whole State at a single centre. This affords a basis for the thorough study of social and vital conditions in every part, which will enable us in the

future not only to compare different counties and districts with each other, but also each city with every other. Our larger cities will need to make that closer inquiry which is thus made easy of comparing different streets and parts of its own municipality in order to find the operative causes of variable death rates.

The more difficult question to deal with at present is how to tabulate the statistics which are obtained so as to make them correct inferences.

Some of the most valuable deductions can only be made by comparisons of one year with another. As our former statistics have long been admitted as valueless for any sanitary or disease study we can only rely upon such as shall be soon furnished from year to year.

It is important at the start to settle definitely as to the use to be made of the figures and the kind of analysis which will be instructive.

As the returns of deaths and causes of death can be more informingly dealt with in the start, it is best for the present year chiefly to consider how we are to get indications for sanitary care and advisement from these.

1. The first apparent principle is that the proportion of deaths to the number living is an indication of the prevalent mortality of a people. It is also an approximate indication of the amount of sickness, and of the prevalent stamina of the population. To this general statement there are found to be some collateral limitations which need to be regarded in constructing life tables.

2. We need to deal with large areas and with smaller areas in various localities and of various density of population in order that our generalizations may be more accurate, that our comparisons may be more numerous, that our mode of dealing with variations in special localities may be fully certified. It is partly for this reason that not less than one thousand is usually taken as the unit for statement of death rate.

The aggregate of deaths and the aggregate of the living have fluctuations, which would lead to erroneous generalizations. Errors from this source can, to a very great degree, be avoided by dealing with decades or lesser divisions of age.

3. This leads to the proposition that tables of mortality must present the proportions of the death at each age to the living at

equal age. The careful study of this subject by vital statisticians, both in reference to vital returns and the interests of life assurance has led to the conclusion that "the rate of mortality in decennial periods furnishes the most satisfactory basis for determining the series of facts which will express the probabilities of life. It is also usual to include all the ages under ten in a decennial period, making deaths under five a distinct column in addition.

It is also claimed by many that all deaths under one year should form a separate column, although others have shown that in an aggregate, if included with all under five, they do not disturb the reliable approximation to accuracy.

4. For the same reason it is important to know the number of the living at each of these ages and the number of births, since only thus can we accurately know the amount of material with which disease and death are having to deal. Where birth returns are incomplete, the whole number living under one year of age added to those who have died under that age within the year, enables us to reckon as to the deficiency with an approximation that is safe in dealing with large numbers and extended areas.

5. If we add together the ages of all who die and divide the sum by the number of deaths we get the *mean age at death.* Formerly the health of two populations was supposed to be indicated by the mean life time, and this to be in the proportion of the mean age at death as thus shown. The mean age at death does bear upon the laws of longevity and race-conditions. But in the light of the closer analysis afforded by finding the proportions of death at different ages to corresponding ages of population, and of the whole to the parts, it is evident that this method alone is not reliable.

Another method of securing the mean age at death is approximate. It is illustrated thus: If one hundred thousand persons born at the same moment were followed through life, the number that died in each year of age noted, and the sum of these ages divided by one hundred thousand, the average ages which they lived would be obtained. The mean duration of their lives would be their mean age at death.

If these were a fair sample of the law of life in their country or place of residence, this would give us the mean future life-time of those born at any successive period, or what is called "the

expectation of life." On such a basis life insurance and life annuities can be predicated, and a standard furnished by which to estimate the deviations occasioned by disturbing causes and the methods of their abatement. This idea is practicalized by taking the population living at each age in the middle of a year (thus avoiding some fluctuations which might appertain to adjacent years,) and the deaths in the same year at the same age. We thus obtain the actual mortality both as to number and ages and the proportions, and so come to know the mean duration and expectation of life. At the same we possess ourselves of details of data that help much in the study of the devitalizing burdens of population.

6. Another recognized principal as to vital statistics is that some diseases and deaths at certain ages are far more informatory than others as to artificial and avoidable causes of disease. The so-called zymotic diseases, for instance such as scarlet fever, diphtheria, etc., have, by analysis of facts as to the conditions of their excessive prevalence, established for themselves such indicative value as that Simon has associated them under the name of filth diseases.

The alvine fluxes such as diarrhœa, cholera infantum, etc., and the lung diseases of early childhood are quite informatory as to local surroundings. Thus an analysis of the lives of 100,000 children born in one year, as actually made under the direction of the English Statistical Bureau, showed that 25,799 died within five years. "Closer inquiry showed that prevention depended very much upon the power of parents to supply food and raiment, upon the mother's watchfulness and cleanliness, upon the air they are doomed to respire in imprisoned courts and alleys, or in the fresh open atmosphere of healthy country districts." Similar inquiries in subsequent decennial periods show the effects of school life, of trades, and of the various influences which either establish or undermine physical vigor.

We are thus able to ascertain to what degree life is shortened, under unfavorable conditions, what these conditions are and how they may be vacated.

"These items," says one, "are as indispensable in sanitary inquiries as the barometer or thermometer, or other instruments in physical research. The influence of any external cause or combination of causes can be analyzed, while without this aid

ıd extended observation and calculation we are liable to be ıisled at every step by vague opinions, well concocted stories, : interested statements." These are our instruments of pre- sion, without which we have not the data for reckoning by hich to determine fluctuation, and so guard against disturbing ırces. It is because the State and society can not afford to be ;norant of such social conditions as are subject to ascertainable ıws of progress or deterioration that studies like these touch ery nearly the polity of any people.

To those who merely view statistics from afar, or are bewil- ered over masses of figures—as they would be bewildered in printing office because they have not set type—there is a ten- ency to conclude that there are so many sources of error that eliable results cannot be obtained or safe deductions made ıerefrom.

There is no such wilderness as that of unexplored statistics, nd no such confusion as that arising from the misplacement or l-assortment of figures. On the other hand, there is no greater ıcidity than that of a problem mathematically demonstrated nd certified by the application and experience of competent bservers.

It ought to be quite sufficient that the students of vital and ocial conditions who have based their studies on such methods ave established for themselves the fullest recognition and have ecome thereby indispensable to the nationalities in which they re citizens. The names of Halley, Finlaison, Farr, Graham, Quintelet, Bertillon, Berg, Beneke, Walker, Snow, and many thers are not the names of statistical dreamers or visionary ex- erts, but of men whose services their respective governments ave gladly commended in the interests of the population.

Additional to this is the fact that the methods they have evised, and the results they have indicated have been made the asis of such economic administrations as have resulted in ap- reciating the welfare of the people.

Fifty years of actual experience has shown that Joshua Milne ras right when he said: " Whether the population is stationary, ncreasing or decreasing, and whether such changes be produced y procreation, mortality or migration, or by the joint operation f any two or more of these causes, provided that the mode of heir operation be uniform, or nearly so, and not by sudden

starts, the law of mortality may be approached near enough for any useful purpose by actual enumeration and the bills of mortality."

The men who have inclined to and pursued the study have not generally been men of diffuse inference, but rather those who rely upon mathematical deductions and subject themselves to the severest tests of experience.

Halley, the inventor of life tables, had as the test of his correctness that he was the first to accurately predict the return of a comet. "He believed in the constancy of the laws of nature and ventured from a knowledge of a part of a curve of a comet to predict the whole." Applying similar methods of study to facts and observations about human life, he conceived the possibility of defining its course and conduct, of studying its variations, and thus brought the science of numbers to bear upon the determination of health, disease and longevity, and so gave an introduction to those numerical methods which are now doing so much in teaching us how to deal with great variations from ascertained health-standards. It is this that led General Graham, the Registrar for England, to say "that much light is being thrown on the physical condition of the respective populations such as suggests many ways of diminishing the suffering and ameliorating the condition of the people, for the longer life of a nation denotes more than it does in an individual; a happier life—a life more exempt from sickness and infirmity —a life of greater energy and industry, of greater experience and wisdom. We can thus read of sickness diminished, deformity banished, life saved—of victories over death and the grave with as much enthusiasm as of victories over armies in the field." "The deaths and the causes of death," said Dr. Farr in his first report, "are scientific facts which admit of numerical analysis. Science has nothing to offer more inviting than the laws of vitality, the variations of these laws in the two sexes at different ages, the influences of occupation, locality, seasons and other physical agencies either in generating disease, inducing death or improving the public health." The tendency to guessing or loose inference on insufficient number of cases is very common.

It is a great thing for any study, whether of physical life or social condition, when it attempts to substitute exactness for

vague conjecture. All the more when the attempt at once reveals laws and shows us the method by which we can eliminate or offset errors. By enumerating the ages of population, the deaths at different periods, by comparison with birth or death registers, by so associating different periods and different localities as to detect imperfect returns, by comparisons of life and death and population tables, and by various applications of expert methods of analyses, and methods of securing closeness of observation and collateral tests of accuracy, this study has come to assume a definiteness which is thoroughly scientific and eminently practical. Imperfections in returns which mislead or confuse a casual observer are duly weighed and allowed for by the systems in use. Like the long-discussed proposition of Farr, as to specific population, or the relation of density to proximity, which has so recently been certified as correct by Dr. Robertson and Prof. Tait, so have other reasonings of the vital statiscians stood the test of accuracy. The calculations of probabilities gives mathematical result.

The causes of disease are drawn with precision, and graphic methods are enabling us to compare and study results, and to test and correct possible errors where they might exist. In such a study there are disturbing factors, which, as being on opposite sides of the equation, balance each other.

No true student of such a science but that recognizes fallacies to be guarded against, and elements of confusion in the initial efforts at registry. But the mariner must not throw his compass overboard because there is a real and sometimes unaccountable fluctuation of the needle. In guiding human life amid its shoals or deep waters, statistics afford us equally valuable and indispensable aids, although it is true they need a close supervision in order that accuracy and completeness may be secured.

Without now entering into all the details of methods by which such a study is conducted, it is in order to say that our registration system was not adopted without close inquiry into the plans of other States as well as of those of foreign governments. It has already commanded the attention of experts in this line of study and practice, and is so commended by those who have examined it as to give great occasion for hopefulness. There are lessons which can only be learned by actual experience and comparisons that can only be made at the

shortest, at quinquennial periods. But in the meanwhile the records will be valuable in all legal aspects, while in some regards we shall be able to study the comparative figures of each year, and of each city and county with great advantage.

We have no reason to apprehend any difficulty in securing reports from each township or city, and in increasing their accuracy and completeness. With those who have thus far had occasion to examine the returns for legal evidence, there is a uniform expression of satisfaction.

Our table of returns is made to reach from July 1st, to July 1st, of each succeeding year. For facility of comparison, it were better to have the report reach from January to January. But because this report must be made by the 1st of November, this is not feasible unless the report should only reach to the preceding January. It has been thought better, therefore to have it embrace a year which reaches to July 1st, and so is easily divisible into half year or quarterly estimates for purposes of comparison. The returns for June of 1878, as thus left out of the tabular classification, are all duly filed and indexed, and are given by counties and cities in a separate part of the report, and not included here in the summary for a year.

Guarding ourselves against arrangements of figures and deductions therefrom, or insufficient data, we shall, this year, need to deal only with a few tables. The tables will show the actual number of Marriages, Births and Deaths, as returned from each township and from each city of over five thousand inhabitants.

As occasionally returns were made by assessors over the line of their townships, which could not always be adjusted until greater familiarity with boundaries was acquired, there will be some slight variations in numbers, but none sufficient to be serious disturbing factors in the general estimate, and none that are not noted upon the original index sheets, as where burials from other States or reburials took place. Various tables as to marriages, showing ages, nativity, percentage to the population, occupation, etc., and similar items as to births, and comparisons with previous years, would not, if now made, be available for any practical purpose. They are on record and indexed so as to be easily consulted. The State has, as yet, made no provision for such full transcription of the returns as is desirable. Of these we at present give only the local numbers and general summary.

'he most important table to be made at present is that which, after howing the number of deaths in each statistical district, then hows the principal causes of death and the ages of the decents. Thus we are enabled at once to study the influence of ocal causes of disease, and to compare one locality and one part f the population with another at marked periods of age. Vhile for some purposes it is advisable to study population in uinquennial or decennial periods for the purpose of this comarision, we have taken the ages used for this purpose by the ighest European authority, and the same selection of diseases, vith the addition of two or three incident to our national and tate locality.

It is hoped that ere long we will be able to deal thus with ach disease at shorter periods of life, and with it to associate a loser study of occupation, circumstances and modes of life. Already some of the data of these tables are prepared. The abulation will be made to such a degree as the State Board of Iealth, under provisions of the State may direct.

In dealing with the death returns, we have the satisfaction of knowing that we are able to give with great accuracy the actual leath rate of each locality, with ages and other vital facts.

While the statement of causes of death depend much upon he diagnostic accuracy of the attendant in charge, and there is ome just criticism as to the competency of some who furnish ertificates, yet for the leading diseases the record is quite ccurate.

It would be better too if the birth returns were as full in roportion to the actual number as the death returns, since this gives the relation between death and birth rates, and the mount of susceptible material furnished for disease or for nsanitary impression. These will be more fully secured each ear, while the record of all deaths before 5 years of age and alculations, established as to the usual proportion of birth ates to population will enable us to secure comparisons pproaching to accuracy.

COMMENTS ON RETURNS.

The twenty-one counties of the State by the census of 1875 ontain 1,020,584 inhabitants.

The deaths as appears from the tabulation from July 1st, 1878, to July 1st, 1879, numbered 20,440. This is a death rate of 20.02 per 1000 for the whole State. Of these the large proportion of 7,919 were under five years of age, and of this number 4,452 under one year of age.

The still births are excluded from this summary. Of the remainder of the 20,440, 1,905 died at the ages from childhood to manhood, or from five to under twenty years of age; 5,930 from twenty to sixty years, or in the active working period of life; 4,337 beyond the age of sixty, and 349 at age unknown or not stated.

The returns or index sheets give all the ages so that they may be divided into quinquennial periods, but they are here published nearly as in the quarterly Glasgow summary. The published tables show the proportions for each county and township of the State for all cities over 5,000 inhabitants.

There are twenty-one incorporated cities of the State containing over 5,000 inhabitants, and these as required by law are indexed separately.

Out of the 1,020,584 inhabitants of the State these cities contain 486,541. Besides these many of the townships have their chief population in cities. Out of the 20,440 deaths in the State 11,208 have occurred in these cities.

The area of the whole State is 7,576.68 square miles.

The area of all the twenty-one cities is not yet available.

A study of other cities as related to area shows the great tendency of population to cluster and mass so that parts of some of these towns are so dense as some larger cities. A close examination of a few of these larger cities will show them so small and favorably situated as to be entitled to have only a county death-rate. So on the other hand outside of these cities there are found crowded villages, or ill-situated or ill-managed localities which have a city death-rate, and so make the average of the township large. In one or two instances the county death-rate is made large by this fact. That of Atlantic county is too large because of a defect in census and large temporary population. A careful and systematic comparison of these conditions will well repay medical practitioners, or those who may be studying the vital conditions of population in special localities.

The death rate of each county is given, as also the death rate of each city so that all these may be compared. The death rate of townships is not carried out, because that is easily done as any one may desire, and as the calculated death rate of small or sparse populations for a single year does not convey a proper estimate of real healthfulness. It is true also that in the case of counties and of cities, while the aggregate death rate is informatory or indicative, it needs also to be carefully compared and all modifying circumstances duly weighed. Thus the general death rate of Hudson county, outside of its cities of over five thousand inhabitants, is made to appear larger, because of the comparatively small population outside of these cities, and because as suburbs, or by reason of special localities and exposures, there are small areas which show a very high comparative death rate. Again the death rate of Jersey City, in comparison with Hoboken, is really higher than the figures would indicate, since the city boundary extends to the Hackensack, and includes what is in part a county area. All these points, however, can, in time, be estimated. The great work for cities, and also for larger towns and for some other special localities in counties, is, after knowing the general estimate to take measures to examine sections and parts and find out just where the chief diseases and preventible causes of disease are to be found. Vital facts as to sex, nationality, etc., are fully on record, but, as yet, not sufficient for correct inferences.

DISEASES.

The principal causes of disease have been singled out and tabulated, as found in the report. These include what are known as zymotic diseases, many of which are owing to local or preventible causes. It is also true of most of the other diseases that appear in this list of the principal causes of disease that they largely depend upon foul air, poor food, poor water supply, undue moisture, or other causes that admit of abatement or control. Out of the 20,440 deaths in the twenty-one counties 15,797 are embraced within these principal causes. The rest are scattered among accidents and less prevalent causes of disease. In the estimate no disease of any child under one month of age is included, since these are so often loosely stated or connected

with earlier malnutrition that they would swell the report of infantile diseases beyond their real significance. Of the 15,797 deaths from these principal causes 8,738 occurred in the twenty-one cities of the State, of over 5,000 inhabitants. The total population of these cities is 486,541, that of the rest of the State being 534,043. The tables are of great interest as showing the principal causes of disease, a death-rate of 17.95 for these principal causes in the twenty-one cities, and of 13.21 outside of these. The study and comparisons of such tables help to correct impressions as to the prevalence of disease or epidemics in certain localities. Often these impressions are derived from a few cases, or from one or two sudden deaths, or several in two or three families, or from the inaccurate methods of some physicians in speaking of this or that disease as prevailing.

SMALL-POX.

No case of small pox is reported in the State. New York city, with about the same population reported only two cases the last year, both of which occurred from a non-resident. It must be admitted that epidemics have a kind of periodicity. It is claimed by many that this results from the fact that at the time of a severe epidemic many have it or die, and as in the case of small pox great numbers are vaccinated, and so protected. Thus the material for the disease diminishes, and what remains is so separated and cases so isolated that the disease can not reach the proportion of an epidemic. This is true, although it is also probably true that infection may have their "epizootic" waves which reach us only occasionally. It is the conjunction of meterological and local conditions that causes the epidemic. The former we must study but can not always control. The latter it is believed we can. If so we as effectually prevent result as if we had charge of both of the necessary factors. Even as to the former we may sometimes define the conditions and so protect themselves from them.

DIPHTHERIA AND CROUP.

The number of deaths from diphtheria and croup (1,100) may well excite attention. It is not like consumption, a hereditary

disease, or one dependent upon a variety of causes, but in its invasion is believed to be owing to specific infection from without. With many the cause of membranous croup and "membranous" diphtheria is regarded as identical. They are now so nearly allied in the nomenclature of the profession as not to be separable in returns. The persuasion is gaining ground that the causes of inception are often local, and that we must seek and shall secure prevention of its causes.

SCARLET FEVER.

Scarlet fever with its 627 deaths is still a dreaded scourge of childhood. It is now the topic of much hopeful inquiry. Recent facts look to a possible spontaneous origin of the disease under some flagrant circumstances.

Like diphtheria it needs to be watched in its places of greatest prevalence, and the conditions and circumstances of its outbreak carefully noted. When derived by imported contagion it can often be greatly limited in its virulence and extension. The jurisdiction to be exercised over schools in their relation to the prevalence of contagious diseases is a subject pressing upon us for consideration. It will require very definite declaration of the laws and circumstances of contagion or exposure on the part of physicians, and clear judgment from our educators. The time has come in sanitary science when opinions will not do. The grounds of opinions must be given, in order that these may be reviewed

BOWEL AFFECTIONS.

The large number of deaths from diarrhœal diseases, and especially as associated with the large prevalent death rate under five years of age, points very decidedly to local causes of disease which must be abated. Cities hereby show their great accumulations of evil. When in some country places, as along the sea shore, death rate is high, it is in part traceable to those brought thither for good air, too late to recuperate. Although we have not the data for separating accurately the deaths among temporary residents, we think that the death-rate of Atlantic county from this cause, registers higher per thousand than it otherwise would.

CONSUMPTION.

Consumption demands much careful study with reference to surroundings, localities and occupations. In some trades like those of hatting, glass-blowing, etc., it is always noticeable how often occupation is the cause of death. We refrain from tabulations which seem indicated, because not willing to reason from too few cases or insufficient data. But it is evident that many of our industries need studying in their bearings upon health, and in order to provide such protection from dust, heat, chemical fumes or ill-ventilated enclosures as will save skilled workmen from the incubus of diminished vitality, and the State from the loss of valuable lives. It will be possible ere long to show how certain diseases depend upon definite ascertained conditions, as plainly as the relations of cause and effect is shown in the other physical sciences. It will yet become one of those vital facts which will compel the notice of all rulers of the people, since the welfare of population must be provided for. Such legislation always proves more regulative than punitive, and benefits the whole people by preventing avoidable sources of depopulation and enfeeblement. Demoralization and degradation are often best provided against by attention to the household, school and workshop—protections to which every inhabitant is entitled.

REVIEW.

A review of the deaths and causes of deaths for the entire State, either shows that the past year was one of exceptional good health, or else that the State ranks very high in its capacity for health. A list of all of our smaller cities, and death rates calculated for the usual country areas, where there is a well-settled but scattered population, give us indications as to health, which are highly encouraging. It is highly probable that a death rate of not over 15 per thousand, could be secured by the application of well understood laws of hygiene, with the prospect of still further amelioration. How healthy cities may become is not yet determined. It has been shown in England and Scotland that with some special advantages which cities

enjoy of methodizing sanitary care, it is quite possible to bring down the rate of parts of cities to the rural average.

In our own State the contrast between rural and city districts is as marked as in some of the most neglected parts of our country. It is not too much to say that the imperfect sanitation of some of our most populous cities, and the meagre attention given to any thorough sanitary work, has greatly excited the surprise of sanitarians outside of the State, who have studied these and other similar areas. Hudson and Essex counties, especially, stand in need of a very exact and well-planned study of conditions which now are showing themselves by excessive death-rates, and an enfeeblement of population. The same is true of several cities.

The time has come for the careful study of the statistics of localities and careful consideration of the local care of population as to health. It is a question of prosperity and of progress for individuals and for the State. The State, by a well-devised system, now offers a helping hand. It now behooves that each city and district for itself should see to it that it seeks evidence rather than promiscuous opinions as to healthfulness or insalubrity, and that on the same careful and exact methods it finds what ought to be done, and how and when it should be done.

All that pursue such a course will find that economy and home interests, as well as philanthropy, require a well-planned and well-executed oversight of localities and population in a common cause and for the common welfare.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

Atlantic County.

	M.	B.	D.
Absecon	8	20	13
Atlantic City	19	62	64
Buena Vista	0	19	4
Egg Harbor City	19	39	36
Egg Harbor Township	32	63	54
Galloway	12	50	41
Hamilton	10	41	40
Hammonton	9	28	21
Mullica	2	14	7
Weymouth	0	16	22
	111	352	302

Bergen County.

	M.	B.	D.
Engleswood	23	51	62
Franklin	15	21	35
Harrington	17	35	34
Hohokus	31	55	64
Lodi	18	57	80
Midland	3	19	31
New Barbadoes	33	141	102
Palisade	16	31	37
Ridgefield	7	36	49
Ridgewood	2	30	20
Saddle River	3	8	25
Union	11	77	45
Washington	14	67	52
	193	628	636

Burlington County.

	M.	B.	D.
Bass River	4	33	8
Beverly City	8	37	68
Beverly	4	21	
Bordentown	47	133	86
Burlington	65	145	154
Chester	22	44	50
Chesterfield	8	27	19
Cinnaminson	14	61	66
Evesham	3	41	25
Florence	5	35	24
Little Egg Harbor	19	46	31
Lumberton	5	32	23
Mansfield	5	38	24
Medford	15	31	43
Mt. Laurel	0	25	26
New Hanover	21	53	41
Northampton	69	85	96
Pemberton	18	100	79
Randolph	0	9	11
Shamong	5	21	15
Southampton	21	47	32
Springfield	5	20	25
Washington	3	11	6
Westhampton	0	30	19
Willingboro	5	23	10
Woodland	2	7	8
	373	1,155	989

Camden County.

	M.	B.	D.
Camden	341	888	673
Centre	3	42	30
Delaware	0	28	33
Gloucester	14	78	66
Gloucester City	28	125	72
Haddon	22	71	47
Stockton	11	26	72
Waterford	17	50	38
Winslow	9	40	28
	445	1.348	1,059

Cape May County.

	M.	B.	D.
May City	5	41	5
is	29	42	18
r	28	43	37
le	17	48	42
r	16	21	18
	95	195	120

Cumberland County.

	M.	B.	D.
eton	82	219	133
nercial	10	26	7
ield	6	35	25
ıe	13	26	23
eld	20	72	87
ıwich	13	19	23
well	13	31	28
ıs	51	85	119
ice River	12	78	34
lle	62	218	137
reek	0	18	12
	282	827	628

Essex County.

	M.	B.	D.
ille	11	59	57
ıfield	38	120	110
ell	11	72	50
n	19	39	30
)range	37	167	126
lin	10	20	29
ston	6	5	17
ırn	9	40	33
lair	35	96	71
rk	1,022	3,567	3,116
e	90	435	215
Orange	26	83	54
Orange	9	39	39
	1,323	4,742	3,947

Gloucester County.

	M.	B.	D.
Clayton	28	56	17
Deptford	1	32	35
Franklin	17	79	24
Greenwich	17	56	40
Glassboro	18	86	40
Harrison	15	56	47
Logan	5	29	26
Mantua	11	42	27
Monroe	9	30	38
Washington	14	10	22
West Deptford	2	38	25
Woodbury	29	56	53
Woolwich	9	43	38
	175	613	431

Hudson County.

	M.	B.	D.
Bayonne	15	140	156
Guttenberg	6	11	32
Harrison	9	102	104
Hoboken	221	795	669
Jersey City	576	1,532	2,517
Kearney	5	43	26
North Bergen	11	60	183
Town of Union	34	140	137
Union	3	30	32
Weehawken	1	16	6
West Hoboken	19	104	95
	900	2,973	3,957

Hunterdon County.

	M.	B.	D.
ndria	16	50	32
hem	15	38	26
n	9	45	12
are	35	74	41
Amwell	15	58	20
lin	14	23	17
htown	8	44	12
Bridge	18	46	31
nd	2	13	9
rood	4	20	14
ertville	51	100	82
on	23	59	31
n	32	59	50
ngton	28	75	63
sbury	11	43	35
of Clinton	4	23	29
	1	14	9
Amwell	4	16	14
	285	800	527

Mercer County.

	M.	B.	D.
bersburg	30	114	92
Windsor	14	33	36
	6	13	22
ton	19	57	52
well	35	112	56
nce	9	51	62
ton	33	97	92
on	264	596	653
ington	5	18	16
Windsor	8	22	28
	423	1,113	1,109

Middlesex County.

	M.	B.	D.
Cranbury	20	19	44
East Brunswick	22	87	47
Madison	0	9	19
Monroe	12	38	42
New Brunswick	107	428	325
North Brunswick	10	28	15
Perth Amboy	13	77	77
Piscataway	14	63	38
Raritan	11	46	43
Sayreville	3	6	5
South Amboy	9	52	72
South Brunswick	21	60	46
Woodbridge	10	53	64
	252	966	837

Monmouth County.

	M.	B.	D.
Atlantic	5	22	17
Eatontown	20	44	53
Freehold	35	99	86
Holmdel	5	19	28
Howell	28	74	38
Manalapan	15	53	28
Marlboro	4	28	17
Matawan	20	66	69
Middletown	16	86	80
Millstone	32	39	29
Neptune	8	32	23
Ocean	49	222	170
Raritan	39	94	68
Shrewsbury	51	167	147
Upper Freehold	18	35	42
Wall	29	100	32
	374	1.180	926

Morris County.

	M.	B.	D.
Boonton	24	50	53
Chatham	26	60	58
Chester	9	37	25
Hanover	10	60	104
Jefferson	12	18	31
Mendham	14	44	22
Montville	3	11	21
Morris	41	127	114
Mount Olive	12	45	25
Passaic	7	23	23
Pequannock	12	43	33
Randolph	40	140	119
Rockaway	29	178	130
Roxbury	10	49	49
Washington	13	58	22
	262	943	829

Ocean County.

	M.	B.	D.
Berkeley	2	24	11
Brick	14	64	56
Dover	21	57	40
Eagleswood	1	9	6
Jackson	5	30	17
Lacey	6	19	16
Manchester	4	11	7
Ocean	5	2	9
Plumsted	13	58	17
Stafford	7	22	28
Union	6	22	10
	84	318	217

Passaic County.

	M.	B.	D.
Aquackanonk	2	22	31
Little Falls	10	15	16
Manchester	2	1	14
Passaic	43	204	124
Paterson	347	1,218	994
Pompton	20	42	50
Wayne	0	14	22
West Milford	16	47	36
	440	1,563	1,287

Salem County.

	M.	B.	D.
Elsinboro	1	4	8
Lower Alloways Creek	6	22	13
Lower Penn's Neck	24	24	30
Mannington	0	47	27
Pilesgrove	29	91	60
Pittsgrove	1	61	15
Quinton	11	30	12
Salem	63	89	112
Upper Alloways Creek	19	38	30
Upper Penn's Neck	31	75	54
Upper Pittsgrove	2	37	22
	187	518	383

Somerset County.

	M.	B.	D.
Bedminster	13	34	39
Bernards	19	62	39
Branchburg	3	13	17
Bridgewater	62	174	127
Franklin	16	44	65
Hillsborough	22	55	46
Montgomery	17	41	34
North Plainfield	2	78	45
Warren	5	6	17
	159	507	429

Sussex County.

	M.	B.	D.
Andover	11	21	19
Byram	12	15	16
Frankford	12	25	19
Greene	3	12	14
Hardyston	16	42	34
Hampton	4	11	10
Lafayette	6	10	22
Montague	3	24	9
Newton	29	40	38
Sandyston	14	21	19
Sparta	7	34	26
Stillwater	14	32	21
Vernon	15	6	11
Walpack	10	13	17
Wantage	13	49	55
	169	355	330

Union County.

	M.	B.	D.
Clark	0	1	2
Cranford	2	13	12
Elizabeth	168	747	472
Fanwood	1	16	15
Linden	5	37	29
New Providence	0	17	28
Plainfield	19	188	130
Rahway	58	105	169
Springfield	8	24	19
Summit	10	33	15
Union	2	33	35
Westfield	10	44	40
	283	1,258	966

Warren County.

	M.	B.
Allamuchy	10	9
Belvidere	17	46
Blairstown	12	32
Franklin	20	24
Frelinghuysen	11	18
Greenwich	9	53
Hackettstown	29	39
Hardwick	1	12
Harmony	8	45
Hope	14	22
Independence	13	28
Knowlton	5	31
Lapatcong	3	30
Mansfield	5	40
Oxford	29	35
Pahaquarry	1	6
Phillipsburg	51	213
Town of Washington	37	58
Washington	6	21
	281	762

Totals of Marriages, Births and Deaths for all the counties.

COUNTIES.	M.	B.	
Atlantic	111	352	
Bergen	193	628	
Burlington	373	1,155	
Camden	445	1.348	
Cape May	95	195	
Cumberland	282	827	
Essex	1.323	4.742	
Gloucester	175	613	
Hudson	900	2.973	
Hunterdon	285	800	
Mercer	428	1.113	
Middlesex	252	966	
Monmouth	374	1.180	
Morris	262	943	
Ocean	84	318	
Passaic	440	1.563	
Salem	187	518	
Somerset	159	507	
Sussex	169	355	
Union	283	1.258	
Warren	281	762	
Total	7.096	23,116	2

Return of Deaths from all Causes, and certain specified Diseases in the Counties of the State of New Jersey, for the year ending July 1st, 1879.

COUNTIES OF NEW JERSEY.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	Remittent fever, etc.	Typhoid fever.‡	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung Diseases.	Brain and nervous diseases of child'n.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and Intestinal.	Cancer.	Acute Rheumatism.	Puerperal.	Total deaths from these diseases.
Atlantic	67	77	22	67	66	3	302	15,138	*19.94	......	5	3	......	4	35	44	36	32	30	14	10	15	2	21	7	1	2	....
Bergen	124	112	55	187	150	8	636	35,516	17.90	20	6	26	6	9	26	40	87	76	67	60	22	43	1	26	13	......	6	....
Burlington	207	130	81	257	291	17	980	53,155	18.60	5	25	23	......	10	61	82	155	95	77	58	36	63	1	72	28	4	10	....
Camden	192	265	121	315	212	14	1,059	52,904	19.98	5	20	34	......	21	77	120	187	116	101	53	25	71	4	58	17	4	9	....
Cape May	25	21	10	22	39	3	120	8,190	14.65	......	2	4	......	2	8	10	12	13	13	3	3	11	1	14	2	1	......	....
Cumberland	109	117	62	167	150	23	628	35,311	17.50	1	14	33	1	2	51	53	92	70	47	38	17	41	5	39	15	3	3	....
Essex	938	695	400	1,224	666	24	3,947	168,812	23.38	25	76	145	37	60	253	295	554	413	414	193	104	220	33	144	75	13	28	....
Gloucester	81	69	37	114	124	6	431	24,486	17.60	10	17	9	1	7	23	32	67	55	26	14	8	26	4	24	8	2	......	....
Hudson	1,010	877	352	1,199	458	61	3,957	163,000	24.27	92	36	151	8	51	112	423	414	335	294	107	85	129	22	150	48	12	47	....
Hunterdon	71	52	47	124	204	29	527	37,473	14.06	1	9	8	2	1	16	29	50	55	32	32	18	63	4	37	19	1	2	....
Mercer	222	114	100	362	259	52	1,109	49,884	22.23	2	14	29	......	8	46	113	178	119	57	47	22	105	13	65	25	5	19	....
Middlesex	186	127	87	248	180	9	837	48,313	17.32	15	23	20	1	24	28	88	110	95	63	44	30	46	5	51	14	......	6	....
Monmouth	226	136	88	226	225	25	926	48,500	19.09	8	8	15	1	31	50	83	132	113	55	60	39	46	4	53	16	6	7	....
Morris	150	145	76	225	219	14	829	49,019	16.91	14	8	31	9	18	37	56	111	96	62	31	15	102	7	46	11	6	15	....
Ocean	39	38	19	59	55	7	217	13,707	15.83	......	6	3	......	4	16	17	32	26	18	8	4	15	......	14	1	......	3	....
Passaic	262	296	115	418	277	9	1,287	53,775	23.93	24	6	40	6	9	60	137	186	137	108	74	32	88	8	73	23	7	22	....
Salem	87	43	39	103	105	15	392	22,701	17.26	6	14	6	......	2	14	41	73	36	15	17	6	28	5	27	7	3	3	....
Somerset	65	55	42	104	154	9	429	27,453	15.62	3	5	3	1	1	42	31	55	46	20	23	18	52	......	30	10	1	3	....
Sussex	60	29	28	98	110	5	330	24,010	13.74	5	10	11	......	5	8	17	54	40	18	23	13	26	2	20	9	2	5	....
Union	205	156	84	268	244	9	966	51,758	18.66	22	10	15	4	7	117	91	117	118	102	53	39	79	11	47	18	3	2	....
Warren	126	57	40	143	149	7	522	37,389	13.96	10	10	12	......	1	20	47	77	75	30	20	12	45	5	30	12	2	4	....
	4,452	†3,467	1,905	5,930	4,337	349	20,440	1020,584	‖20.03	268	324	627	77	277	1,100	1,849	2,788	2,160	1,647	972	558	1314	137	1,041	378	76	194	15,797

†Total deaths under five 7,919.

*Death rate too high by reason of defects in the census of county.

‖Death rate, exclusive of cities of over 5000 inhabitants from these diseases, 13.21 per thousand.

‡Small Pox omitted because no deaths occur therefrom.

Warren County.

	M.	B.	D.
Allamuchy	10	9	[illegible]
Belvidere	17	46	33
Blairstown	12	32	21
Franklin	20	24	17
Frelinghuysen	11	18	11
Greenwich	9	53	43
Hackettstown	29	39	41
Hardwick	1	12	4
Harmony	8	45	21
Hope	14	22	17
Independence	13	28	17
Knowlton	5	31	31
Lapatcong	3	30	15
Mansfield	5	40	34
Oxford	29	35	40
Pahaquarry	1	6	5
Phillipsburg	51	213	102
Town of Washington	37	58	36
Washington	6	21	20
	281	762	523

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Gloucester	175	613	431
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Passaic	440	1,563	1,287
Salem	187	518	392
Somerset	159	507	429
Sussex	169	355	330
Union	283	1,258	966
Warren	281	762	523
Total	7,096	23,116	20,440

... of Deaths from all Causes, and certain specified Diseases in the ... the

year ending July 1st, 1879.

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Bergen	124	112	55	187	150	8	636	35,516	17.90	20	6	26	6	9	26	40	87	76	67	60	22	43	1	26	13	......	6	....
Burlington	207	136	81	257	291	17	989	53,155	18.60	5	25	23	......	10	61	82	155	95	77	58	36	63	1	72	28	4	10	....
Camden	192	205	121	315	212	14	1,059	52,994	19.98	5	20	34	......	21	77	120	187	116	101	53	25	71	4	58	17	4	9	....
Cape May	25	21	10	22	39	3	120	8,190	14.65	......	2	4	......	2	8	10	12	13	13	3	3	11	1	14	2	1	......	....
Cumberland	109	117	62	167	150	23	628	35,311	17.50	1	14	33	1	2	51	53	92	70	47	38	17	41	5	30	15	3	3	....
Essex	938	695	400	1,224	666	24	3,947	168,812	23.38	25	76	145	37	60	253	295	554	413	414	193	104	220	33	144	75	13	26	....
Gloucester	81	69	37	114	124	6	431	24,486	17.60	10	17	9	1	7	23	32	67	55	26	14	8	26	4	24	8	2	......	....
Hudson	1,010	877	352	1,199	458	61	3,957	163,000	24.27	92	36	151	8	51	112	423	414	335	294	107	85	129	22	150	48	12	47	....
Hunterdon	71	52	47	124	204	29	527	37,473	14.06	1	9	8	2	1	16	29	50	55	32	32	18	63	4	37	19	1	2	....
Mercer	222	114	100	362	259	52	1,109	49,884	22.23	2	14	29	......	8	46	113	178	119	57	47	22	105	13	65	25	5	19	....
Middlesex	186	127	87	248	180	9	837	48,313	17.32	15	23	26	1	24	28	88	110	95	63	44	30	46	5	51	14	......	6	....
Monmouth	226	136	88	226	225	25	926	48,500	19.00	8	8	15	1	31	50	83	132	113	55	60	39	46	4	53	16	6	7	....
Morris	150	145	76	225	219	14	829	49,019	16.91	14	8	31	9	18	37	56	111	96	62	31	15	102	7	46	11	6	15	....
Ocean	39	38	19	59	55	7	217	13,707	15.83	......	6	3	......	4	16	17	32	26	18	8	4	15	......	14	1	......	3	....
Passaic	262	206	115	418	277	9	1,287	53,775	23.93	24	6	40	6	9	60	137	186	137	106	74	32	88	8	73	23	7	22	....
Salem	87	43	39	103	105	15	392	22,701	17.26	6	14	6	......	2	14	41	73	36	15	17	6	28	5	27	7	3	3	....
Somerset	65	55	42	104	154	9	429	27,453	15.62	3	5	3	1	1	42	31	55	46	20	23	18	52	......	30	10	1	3	....
Sussex	60	29	28	98	110	5	330	24,010	13.74	5	10	11	......	5	8	17	54	40	18	23	13	26	2	20	9	2	5	....
Union	205	156	84	268	244	9	966	51,758	18.66	22	10	15	4	7	117	91	117	118	102	53	39	79	11	47	18	3	2	....
Warren	126	57	40	143	140	7	522	37,380	13.96	10	10	12	......	1	20	47	77	75	30	20	12	45	5	30	12	2	4	....
	4,452	†3,467	1,905	5,930	4,337	349	20,440	1020,584	‡20.03	268	324	627	77	277	1,100	1,849	2,788	2,160	1,647	972	558	1314	137	1,041	378	76	194	15,797

†Total deaths under five 7,919.

*Death rate too high by reason of defects in the census of county,

‡Death rate, exclusive of cities of over 5000 inhabitants from these diseases, 13.21 per thousand.

‡Small Pox omitted because no deaths occur therefrom.

Return of Deaths from all Causes and certain specified Diseases, in the Larger Cities of the State of New Jersey, for the year ending July 1st, 1879.

Incorporated Cities of the State Having by the Census of 1875 over 5000 Inhabitants. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping Cough.	Croup & Diphtheria.	Diarrhoeal diseases	Consumption.	Acute lung diseases	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and Intestinal.	Cancer.	Acute Rheumatism.	Puerperal:	Area of cities so far as given in square miles.
Burlington Co.																												
Burlington	24	34	15	44	36	1	154	7,297	21.10	2	5	5	......	3	19	9	28	15	10	9	7	9	......	9	3	......	3	....
Bordentown	14	17	5	24	26	....	86	5,110	16.82	......	1	2	......	1	5	4	17	5	14	7	3	3	......	7	1	......	1	....
Camden Co.																												
Camden	101	144	91	206	125	6	673	33,852	19.88	4	16	26	......	15	62	77	120	76	71	35	20	36	1	31	10	2	5	6 50-100
Gloucester city	16	7	16	26	7	....	72	5,105	14.10	......	1	1	......	......	1	8	19	5	13	2	......	1	......	8	1	1	2	1 50-100
Cumberland Co.																												
Bridgeton	26	31	10	30	30	6	133	7,953	16.72	......	5	11	......	1	10	15	21	19	5	10	1	7	1	8	4	......	......	9
Millville	31	35	13	33	25	....	137	6,775	20.22	......	2	10	......	1	14	18	14	12	17	6	1	10	......	6	5	......	......	41
Essex Co.																												
Newark	757	569	327	986	460	17	3,116	123,310	25.26	60	65	120	28	44	214	242	448	309	328	142	84	157	18	111	57	9	24	17 91-100
Orange city	57	40	16	70	29	3	215	10,813	19.88	1	3	1	4	5	5	12	33	37	32	8	3	13	2	7	6	......	4	2 50-100
East Orange	26	20	9	39	32	....	126	6,497	19.39	2	2	7	......	1	5	10	13	14	15	12	2	8	2	3	4	1	3	4 25-100
Hudson Co.																												
Jersey City	637	531	216	793	302	38	2,517	109,227	23.04	55	30	98	6	36	51	336	327	254	221	92	50	90	13	123	39	6	39	....
Hoboken	179	166	57	200	59	8	669	24,766	27.01	8	6	16	4	18	75	93	76	78	71	26	17	20	3	14	10	......	7	....
Bayonne	48	40	11	40	12	5	156	5,836	26.73	1	......	4	2	4	14	18	13	20	16	3	6	3	3	4	2	......	1	....
West Hoboken	25	21	14	23	12	....	95	5,219	18.20	3	1	12	......	1	7	10	7	11	10	2	3	2	1	7	1	......	......	....
Mercer Co.																												
Trenton	129	65	55	236	123	45	653	25,031	26.08	1	6	16	......	4	23	72	108	61	29	26	15	65	4	40	10	2	12	....
Middlesex Co.																												
New Brunswick	74	51	37	100	63	....	325	16,660	19.50	4	12	7	1	14	17	25	47	39	31	20	8	20	......	11	8	......	......	....
Morris Co.																												
Morristown	21	22	4	32	32	3	114	6,950	16.40	2	3	2	......	9	......	5	18	13	14	4	3	15	1	5	1	......	2	....
Passaic Co.																												
Paterson	205	154	92	341	195	7	994	38,814	25.61	16	5	37	5	9	41	107	156	94	84	50	22	71	5	63	17	4	17	8 36-100
Union Co.																												
Elizabeth	105	92	51	129	91	4	472	25,923	18.20	6	5	7	......	5	48	47	51	56	49	22	19	38	4	24	8	1	5	6 60-100
Plainfield	29	24	12	31	32	2	130	7,216	18.01	1	1	4	......	1	3	16	17	17	19	6	6	13	2	4	3	......	1	5 92-100
Rahway	28	13	10	62	56	....	169	6,947	24.31	4	1	......	2	......	......	11	32	17	13	11	6	10	3	9	5	1	2	4
Warren Co.																												
Phillipsburg	36	12	11	35	7	1	102	7,240	14.08	......	3	6	......	......	5	10	13	8	4	2	......	7	......	6	1	......	2	75-100
Totals	2,568	2,088	1,172	3,480	1,754	146	11,208	486,541	....	170	178	392	52	172	619	1,145	1,588	1,180	1,086	402	285	598	63	400	196	27	120	8,738 being 17.95 per 1000 from these diseases.

Jersey, by Counties, for the year ending July 1st, 1876.

COUNTY OF ATLANTIC. *POPULAT'N 15,138. STATISTICAL DIVISIONS.	DEATHS AT ALL AGES.							Population, census of 1875.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.		Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive or intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Absecon	4	4	....	4	1	....	13	626	....	......	......	......	......	......	2	2	......	2	1	......	......	2	......	......	......	......	....
Atlantic City	12	24	7	14	7	....	64	3,422	....	......	......	......	......	1	7	14	10	7	8	4	1	5	......	2	......	......	....
Buenna Vista	....	4	....	....	....	....	4	837	....	......	......	1	......	......	......	......	......	......	3	......	......	......	......	......	......	......	....
Egg Harbor City	10	5	....	10	10	1	36	1,516	....	......	......	......	......	......	......	5	6	3	5	......	3	2	1	3	......	1	O. Dropsy,
Egg Harbor Twp	13	15	4	6	16	....	54	3,540	....	......	......	1	......	1	10	7	5	8	3	1	4	1	......	4	2	......	....
Galloway	6	10	2	9	14	....	41	2,180	....	......	......	1	......	1	2	5	4	6	4	4	1	2	......	5	......	......	Died in C.B. 1
Hamilton	14	10	6	6	4	....	40	1,356	....	......	......	......	......	......	12	9	4	1	3	2	......	......	......	3	2	......	....
Hammonton	2	3	....	9	6	1	21	1,545	....	......	4	......	......	......	......	1	2	4	1	......	1	2	1	1	1	......	....
Mullica	1	....	....	3	2	1	7	862	....	......	......	......	......	......	......	1	1	......	......	2	......	......	......	......	2	......	....
Weymouth	5	2	3	6	6	....	22	667	....	......	1	......	......	1	2	......	4	1	2	1	......	1	......	3	......	......	Mitritis, 1.
	67	77	22	67	66	3	302	....	....	......	5	3	......	4	35	44	36	32	30	14	10	15	2	21	7	1	2

*Population of Atlantic City and some of the townships of Atlantic county is imperfect in the census of 1875.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF BERGEN. Population, 35,516. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Adult digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Englewood	15	13	6	22	5	1	62	3,932	....	......	......	3	......	......	2	7	11	9	7	12	1	1	......	2	2	......	C. B. 1
Franklin	2	3	2	15	11	2	35	3,300	....	4	......	......	......	......	1	......	5	6	1	2	1	3	......	3	1	......	......
Harrington	5	4	3	12	10	....	34	2,676	....	1	1	5	......	......	......	2	2	3	3	5	2	2	......	......	1	......	Death in CB 1
Hohokus	5	8	4	21	25	1	64	3,015	....	3	1	1	1	2	1	2	12	6	5	8	3	7	......	1	......	......	C. B. 1
Lodi	22	21	2	22	13	....	80	3,682	....	1	1	......	4	......	2	6	5	11	15	5	2	4	......	4	1	......	C. B. 1
Midland	4	1	3	11	12	....	31	1,620	....	......	1	......	1	......	......	4	7	3	......	4	1	3	......	1	......	......	......
New Barbadoes	26	18	7	30	20	1	102	4,352	....	3	......	2	......	2	5	7	11	13	10	8	7	8	......	3	3	......	C. B. 1
Palisade	9	6	3	12	7	....	37	1,894	....	......	......	3	......	1	1	3	8	4	3	3	......	1	1	2	2	......	......
Ridgefield	14	12	3	10	8	2	49	3,564	....	1	......	7	......	2	3	5	3	3	8	3	2	3	......	2	2	......	......
Ridgewood	4	5	1	5	5	....	20	....	....	......	......	......	......	......	......	1	6	1	4	1	1	1	......	3	......	......	......
Saddle River	2	6	5	4	8	....	25	1,424	....	1	2	2	......	......	2	......	3	5	3	3	......	1	......	......	......	......	......
Union	9	9	7	15	5	....	45	3,057	....	2	......	3	......	2	6	1	7	7	3	1	......	2	......	2	......	......	......
Washington	7	6	9	8	21	1	52	3,000	....	4	......	......	......	......	3	2	7	5	5	5	2	7	......	3	1	......	C. B. 1
	124	112	55	187	150	8	636	....	17.90	20	6	26	6	9	26	40	87	76	67	60	22	43	1	26	13	......	6

COUNTY OF BURLINGTON. Population 53,155. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Bass River	2	2	2	1	1	....	8	1,003	....
Beverly	14	12	12	17	11	2	68	2,361	....
Bordentown*	14	17	5	24	26	....	86	5,110	....
Burlington*	24	34	15	44	36	1	154	7,297	....
Chester	12	6	3	11	16	2	50	2,412	....
Chesterfield	5	....	2	6	5	1	19	1,520	....
Cinnaminson	18	9	9	18	11	1	66	3,358	....
Evesham	4	5	3	7	6	....	25	1,553	....
Florence	7	5	2	4	6	....	24	1,534	....
Little Egg Harbor	5	5	1	10	8	2	31	1,800	....
Lumberton	7	4	....	3	9	....	23	1,615	....
Mansfield	7	2	1	5	8	1	24	1,597	....
Medford	6	3	4	14	14	2	43	2,208	....
Mount Laurel	6	4	1	2	12	1	26	1,673	....
New Hanover	7	5	2	14	13	....	41	2,542	....
Northhampton	17	8	4	32	35	....	96	4,108	....
Pemberton	20	7	3	15	32	2	79	3,008	....
Randolph	3	1	1	2	4	....	11	460	....
Shamong	3	....	1	2	7	2	15	1,097	....
Southampton	9	1	3	7	12	....	32	2,430	....
Springfield	6	....	2	9	8	....	25	1,747	....
Washington	1	1	2	1	1	....	6	499	....
Westhampton	7	2	1	5	4	....	19	1,200	....
Willingboro	2	2	1	....	5	....	10	690	....
Woodland	1	1	1	4	1	....	8	333	....
Death rate per 1000 of county	....	....	....	....	....	....	....	....	18.60
Death rate per 1000 of county, exclusive of cities	....	....	....	....	....	....	....	....	18.38
	207	136	81	257	291	17	989	53,155	....

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhœal diseases.	Consumption.	Acute Lung Diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bass River	......	......	......	......	......	3	2	1	......	3	1	......	1	......	......	......	......	......
Beverly	......	1	3	......	1	7	1	10	3	4	2	3	4	......	5	......	2	......
Bordentown*	......	1	2	......	1	5	4	17	5	14	7	3	3	......	7	1	......	1
Burlington*	2	5	5	......	3	19	9	28	15	10	9	7	9	......	9	3	......	3
Chester	......	......	3	......	......	1	5	8	3	6	6	......	5	......	3	......	......	......
Chesterfield	......	......	1	......	......	......	......	3	1	2	1	1	2	......	5	......	1	......
Cinnaminson	......	2	4	......	......	7	6	11	5	9	4	3	2	......	4	2	......	1
Evesham	......	1	......	......	......	2	2	4	1	1	2	......	2	......	1	1	......	......
Florence	2	......	1	......	......	......	4	4	3	3	1	1	......	......	......	1	......	......
Little Egg Harbor	......	1	......	......	......	2	3	4	3	2	1	1	1	......	3	......	......	1
Lumberton	......	1	1	......	......	......	5	1	1	2	......	......	1	......	2	1	......	......
Mansfield	......	......	......	......	......	......	4	2	1	2	4	1	1	......	1	......	......	1
Medford	......	1	1	......	......	......	1	8	4	4	3	3	3	......	2	4	......	......
Mount Laurel	......	......	......	......	......	1	4	4	1	......	3	......	2	......	2	2	......	......
New Hanover	1	4	......	......	......	2	3	8	7	......	......	1	1	......	5	1	......	1
Northhampton	......	1	2	......	1	3	11	17	8	2	2	7	11	1	4	6	......	1
Pemberton	......	3	......	......	......	3	8	12	15	7	4	1	6	......	6	1	......	......
Randolph	......	......	......	......	......	1	1	......	3	1	1	......	......	......	2	1	......	......
Shamong	......	......	......	......	......	1	1	1	2	1	4	......	2	......	1	......	......	......
Southampton	......	......	......	......	......	2	1	4	4	1	......	1	2	......	4	1	......	1
Springfield	......	2	......	......	......	1	3	4	5	1	......	......	4	......	1	1	1	......
Washington	......	......	......	......	......	......	......	......	2	1	......	......	......	......	1	1	......	......
Westhampton	......	2	......	......	4	......	2	3	2	......	......	1	......	......	2	......	......	......
Willingboro	......	......	......	......	......	1	2	......	......	1	2	......	1	......	......	......	......	......
Woodland	......	......	......	......	......	......	......	1	......	......	1	2	......	......	2	1	......	......
Death rate per 1000 of county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 of county, exclusive of cities	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	5	25	23	......	10	61	82	155	94	77	58	36	63	1	72	28	4	10

*See register of cities.

Return of Deaths from all Causes and certain specified Diseases, in the Seatistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF CAMDEN. Population, 52,994. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Camden City*	101	144	91	206	125	6	673	33,852	....	4	16	26	......	15	62	77	120	76	71	35	20	36	1	31	10	2	4
Centre	9	5	1	8	5	2	30	1,261	....	......	1	......	......	1	3	5	2	6	3	2	......	2	......	1	......	......	......
Delaware	13	4	1	4	11	....	33	1,358	....	......	......	2	......	......	......	4	1	6	5	4	1	4	......	......	......	......	......
Gloucester	11	4	2	26	20	3	66	2,501	....	1	1	......	......	......	1	8	14	6	2	5	......	14	......	5	......	......	1
Gloucester City*	16	7	16	26	7	....	72	5,105	....	......	1	1	......	......	1	8	19	5	13	2	......	1	......	8	1	1	2
Haddon	10	2	3	17	13	2	47	2,541	....	......	......	1	......	......	2	3	11	2	2	1	2	5	......	3	1	......	......
Merchantville†	....	....	....	....	....	....	....	380	....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Stockton	12	23	2	20	13	1	72	2,106	....	......	......	......	......	3	5	8	14	5	9	4	2	5	......	5	4	......	1
Waterford	13	6	3	7	10	....	38	2,003	....	......	1	1	......	......	1	6	4	5	4	......	......	4	1	2	1	......	1
Winslow	7	10	2	1	8	....	28	1,887	....	......	......	3	......	2	2	1	2	5	2	......	......	......	2	3	......	1	......
Death rate per 1000 for county	....	....	....	....	....	....	....	....	19.98	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county exclusive of cities*	....	....	....	....	....	....	....	....	22.36	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	192	205	121	315	212	14	1,059	52,994	....	5	20	34	......	21	77	120	187	116	101	54	25	71	4	58	17	4	9

*See Register of cities and low rate of Gloucester City.

†See Stockton.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF CAPE MAY. Population, 8,190. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Cape May City	1	3	......	......	1	......	5	1,201	......	......	......	2	......	......	......	......	......	......	1	......	......	......	......	1	......	......	......
Dennis	3	1	1	3	8	2	18	1,585	......	......	......	......	......	......	......	1	2	4	2	......	......	2	......	3	......	......	......
Lower	9	7	4	10	7	......	37	1,480	......	......	1	......	......	......	4	3	5	2	7	1	2	4	......	2	2	......	......
Middle	10	8	4	8	11	1	42	2,355	......	......	1	1	......	2	4	5	3	6	2	2	......	1	1	5	......	......	......
Upper	2	2	1	1	12	......	18	1,569	......	......	......	1	......	......	......	1	2	1	1	......	1	4	......	3	......	1	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	14.65	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	25	21	10	22	39	3	120	......	......	......	2	4	......	2	8	10	12	13	13	3	3	11	1	14	2	1	......

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF CUMBERLAND. Population 35,311. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Bridgeton	26	31	10	30	30	6	133	7,953	....
Commercial	2	....	....	4	1	....	7	2,152	....
Deerfield	5	6	1	7	5	1	25	1,470	....
Downs	6	2	2	7	4	2	23	1,560	....
Fairfield	14	16	10	22	17	8	87	3,310	....
Greenwich	4	6	1	6	5	1	23	1,173	....
Hopewell	3	1	5	6	13	....	28	1,715	....
Landis	6	19	16	34	41	3	119	5,431	....
Maurice River	7	1	3	13	8	2	34	2,628	....
Millville	31	35	13	33	25	....	137	6,775	....
Stoe Creek	5	....	1	5	1	....	12	1,144	....
Death rate per 1000 for county	....	....	....	....	....	....	....	....	17.50
Death rate per 1000 for county, exclusive of cities	....	....	....	....	....	....	....	....	17.39
	109	117	62	167	150	23	628	35,311	....

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diptheria.	Diarrhoeal diseases.	Consumption	Acute Lung Diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bridgeton	......	5	11	......	1	10	15	21	19	5	10	1	7	1	8	4	......	......
Commercial	......	......	......	......	......	......	......	1	......	......	2	......	1	......	2	......	......	......
Deerfield	......	......	......	......	......	2	1	2	5	2	1	......	1	......	......	......	......	1
Downs	......	1	1	......	......	1	......	1	2	1	2	2	2	......	1	......	1	......
Fairfield	1	3	5	......	......	15	6	8	8	5	5	3	8	2	7	1	......	......
Greenwich	......	......	1	......	......	1	4	2	2	1	2	1	2	1	1	......	......	......
Hopewell	......	1	1	......	......	......	1	7	1	2	......	2	2	......	4	......	2	......
Landis	......	2	4	1	......	7	6	21	15	10	7	6	6	1	7	5	......	2
Maurice River	......	......	......	......	......	......	1	14	4	3	1	1	1	......	2	......	......	......
Millville	......	2	10	......	1	14	18	14	12	17	6	1	10	......	6	5	......	......
Stoe Creek	......	......	......	......	......	1	1	1	2	1	2	......	1	......	1	......	......	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	1	14	33	1	2	51	53	92	70	47	38	17	41	5	30	15	3	3

*See Register of cities.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF ESSEX. Population, 168,812. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Belleville	14	10	2	13	18	....	57	2,795	....
Bloomfield	17	15	18	26	34	....	110	5,425	....
Caldwell	8	5	5	9	23	....	50	2,897	....
Clinton	7	6	2	9	6	....	30	2,657	....
East Orange	28	20	9	39	32	....	126	6,497	....
Franklin	6	1	3	12	7	....	29	1,556	....
Livingston	1	5	1	5	5	....	17	1,200	....
Millburn	3	8	6	9	5	2	33	1,541	....
Montclair	19	8	5	18	19	2	71	4,034	....
Newark	757	569	327	986	460	17	3,116	123,310	....
Orange	57	40	16	70	29	3	215	10,813	....
South Orange	15	6	2	18	13	....	54	3,252	....
West Orange	8	2	4	10	15	....	39	2,835	....
Death rate per 1000 for county	....	....	....	....	....	....	....	....	23.38
Death rate per 1000 for county exclusive of cities	....	....	....	....	....	....	....	....	17.38
	938	695	400	1,224	666	24	3,947	168,812	....

PRINCIPAL CAUSES OF DEATH.

Statistical Divisions.	Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Belleville	3	......	1	......	2	......	4	4	10	13	5	......	6	......	3	1	......	......
Bloomfield	4	......	5	......	2	15	3	14	8	11	4	6	9	2	7	......	......	......
Caldwell	3	2	......	......	......	2	3	7	5	1	5	......	8	2	1	......	2	......
Clinton	......	......	1	1	......	1	4	6	......	3	......	2	1	......	2	3	......	......
East Orange	2	2	7	......	1	5	10	13	14	15	12	2	8	2	3	4	1	......
Franklin	4	......	2	......	......	......	......	4	5	2	1	......	4	......	......	......	......	1
Livingston	2	......	......	......	......	......	......	3	1	2	2	......	2	......	1	......	......	......
Millburn	4	......	3	4	1	1	2	3	......	......	1	......	1	1	3	......	......	1
Montclair	......	4	3	......	3	4	8	5	7	4	7	2	6	......	4	......	......	......
Newark	60	65	120	28	44	214	242	448	309	328	142	84	157	18	111	57	9	24
Orange	1	3	1	4	5	5	12	33	37	32	8	3	13	2	7	6	......	......
South Orange	2	......	......	......	2	2	4	9	10	2	2	4	2	3	2	2	1	......
West Orange	......	......	2	......	......	4	3	5	7	1	4	1	3	3	......	2	......	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county exclusive of cities	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	85	76	145	37	60	253	295	554	413	414	193	104	220	33	144	75	13	26

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF GLOUCESTER. Population, 24,486. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Clayton	2	2	1	7	5	......	17	3,744	......
Deptford	9	6	4	9	7	......	35	1,304	......
Franklin	6	2	3	5	8	......	24	2,159	......
Glassboro	7	7	3	8	15	......	40	......	......
Greenwich	7	2	1	13	17	......	40	2,340	......
Harrison	7	12	5	9	14	......	47	2,885	......
Logan	8	1	4	7	6	......	26	......	......
Mantua	7	4	1	8	7	......	27	1,710	......
Monroe	5	10	5	10	6	2	38	1,696	......
Washington	3	4	......	5	10	......	22	1,317	......
West Deptford	5	2	3	7	8	......	25	1,462	......
Woodbury	9	7	2	15	15	4	52	2,029	......
Woolwich	6	10	5	11	6	......	38	3,840	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	17.60
	81	69	37	114	124	6	431	24,486	......

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Clayton	2	1	......	......	......	......	2	6	3	2	......	......	......	1	......	......	......	......
Deptford	......	1	1	......	......	4	2	3	6	2	1	3	2	......	......	4	......	......
Franklin	......	......	1	......	......	......	1	4	3	1	1	......	4	......	2	......	......	......
Glassboro	3	1	2	......	3	1	2	4	3	3	2	......	1	......	4	......	......	......
Greenwich	......	1	......	......	......	1	4	4	4	......	2	......	6	......	4	......	......	......
Harrison	2	4	2	......	......	5	4	12	4	1	1	2	2	1	2	2	......	......
Logan	......	......	1	......	......	......	2	5	3	1	......	......	3	1	3	......	......	......
Mantua	......	......	......	......	......	1	1	5	5	4	......	......	1	......	3	1	......	......
Monroe	1	6	......	1	1	2	5	6	4	3	1	......	......	......	3	......	......	......
Washington	......	......	......	......	1	1	1	7	2	1	1	1	3	1	......	......	......	......
West Deptford	......	3	......	......	......	1	2	2	6	3	1	1	......	......	......	......	......	......
Woodbury	2	......	......	......	1	1	4	4	10	2	3	1	4	......	2	......	......	......
Woolwich	......	......	2	......	1	6	2	5	2	3	1	......	2	......	1	1	2	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	10	17	9	1	7	23	32	67	55	26	14	8	26	4	24	8	2	......

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF HUDSON. Population, 163,000. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrheal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal.	Cancer.	Acute Rheumatism.	Puerperal.
Bayonne	48	40	11	40	12	5	156	5,836	....	1	......	4	2	4	14	18	13	20	16	3	6	3	3	4	2	......	1
Guttenberg	9	8	6	7	2	....	32	....	....	3	......	8	......	1	1	4	1	3	3	......	......	1	......	......	1	......	2
Harrison	29	29	13	24	9	....	104	4,765	....	10	2	3	......	4	5	15	12	11	16	2	1	3	......	2	......	......	......
Hoboken	179	166	57	200	59	8	669	24,766	....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Jersey City	637	531	216	793	302	38	2,517	109,227	....	55	30	98	6	36	51	336	327	254	221	92	59	90	13	123	39	6	39
Kearney	5	4	3	9	5	....	26	1,401	....	4	......	......	......	......	1	1	2	3	4	......	......	1	......	3	1	......	1
North Bergen	28	40	12	62	39	2	183	3,928	....	12	......	8	......	1	17	15	34	15	9	1	7	24	3	6	2	......	1
Town of Union	42	26	17	34	10	8	137	4,676	....	2	3	14	......	1	14	20	14	10	13	5	8	4	2	4	1	......	2
Union Township	6	11	3	7	5	....	32	2,580	....	2	......	4	......	3	2	4	4	6	1	1	1	......	......	1	1	......	1
Weehawken	2	1	....	....	3	....	6	602	....	......	......	......	......	......	......	......	......	2	1	1	......	1	......	......	......	......	......
West Hoboken	25	21	14	23	12	....	95	5,219	....	3	1	12	......	1	7	10	7	11	10	2	3	2	1	7	1	......	......
Death rate per 1000 for county	....	....	....	....	....	....	....	....	24.27	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county exclusive of cities	....	....	....	....	....	....	....	....	28.96	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	1,010	877	352	1,199	458	61	3,957	163,000	....	92	•36	151	8	51	112	423	414	335	294	107	85	129	22	150	48	6	47

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF HUNTERDON. Population, 37,473. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping Cough.	Croup & Diphtheria.	Diarrheal diseases.	Consumption.	Acute lung diseases	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal.	Cancer.	Acute Rheumatism.	Puerperal.
Alexandria	3	1	2	8	17	1	32	1,416			1					1	4	5	1	3	1	5			1		
Bethlehem	1	3	2	9	9	2	26	2,826				1			2		3	4	1	1	2	2		2			
Clinton Borough	1		1	3	6	1	12	2,043								1	3	1				2	1	1			
Delaware	4	4		13	16	4	41	3,096			2						6	5	1	4	1	6		5	1		
East Amwell	2	3	2	2	10	1	20	1,684				1			1	2	1	2	1	1		3		2		1	
Franklin	1		2	5	7	2	17	1,333								1	1	1	1		1	6					
Frenchtown	1	1		5	5		12	960									2		1		1	2		2			
High Bridge	7	5	3	6	7	3	31	2,020			2				3	3	2	3	4	1	1	2			1		
Holland	2	1		2	3	1	9	1,852			1							4			1						
Kingwood	1		1	2	9	1	14	1,779								1	1	4	2		2	2			1		
Lambertville	18	6	12	23	22	1	82	4,134			1				2	9	9	7	9	5		4		9	2		
Lebanon	4	6	5	8	8		31	2,760			1			1	1	2	5	1	2	2	2	4		2	1		
Raritan	5	5	3	11	24	2	50	3,546		1		1			1	3	7	2	3	6	1	5		4	6		1
Readington	9	11	5	14	20	4	63	3,043				2	2		5	2	8	6	3	3	2	10		7			
Tewksbury	5	3	3	6	15	3	35	1,983			1						3	6	2	1		6	3		2		1
Town of Clinton	3	2	4	3	15	2	29	900				2			1	3	2			5	2	4			3		
Union	2		1	2	4		9	1,080				1					1	3			1			1			
West Amwell	2	1	1	2	7	1	14	1,018								1	1	1	1					2	1		
Death rate per 1000 for county									14.06																		
	71	52	47	124	204	29	527	37,473		1	9	8	2	1	16	29	59	55	32	32	18	63	4	37	19	1	2

Return of Deaths from all causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF MERCER. Population, 49,884. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Chambersburg	27	9	7	29	18	2	92	3,768	......	......	1	3	1	......	2	10	16	9	6	1	......	8	3	3	4	2	3
East Windsor	8	3	4	10	10	1	36	2,230	......	......	1	3	......	......	......	5	2	2	3	3	1	2	......	4	2	......	......
Ewing	3	1	3	8	7	......	22	1,805	......	......	......	......	......	......	......	2	6	......	2	......	......	3	......	1	......	......	1
Hamilton	5	4	6	17	18	2	52	3,450	......	......	1	......	......	1	4	4	10	5	3	4	1	4	1	2	3	......	......
Hopewell	8	4	6	17	19	2	56	4,372	......	......	1	......	......	......	7	2	12	7	2	4	1	9	3	1	3	......	......
Lawrence	9	13	4	18	18	......	62	2,679	......	1	2	......	......	1	9	1	7	10	5	4	1	4	1	2	1	......	2
Princeton	25	10	10	16	31	......	92	3,923	......	......	1	1	......	1	......	5	12	17	7	2	3	8	1	8	1	......	1
Trenton	129	65	55	236	123	45	653	25,031	......	1	6	16	......	4	23	72	108	61	29	26	15	65	4	40	10	2	12
Washington	2	1	2	4	7	......	16	1,264	......	......	......	......	......	......	......	1	3	3	......	3	......	1	......	......	......	......	......
West Windsor	6	4	3	7	8	......	28	1,362	......	......	......	5	......	1	1	1	2	5	......	......	......	1	......	4	1	1	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	22.23	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities	......	......	......	......	......	......	......	......	18.34	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	222	114	100	362	259	52	1,109	49,884	......	2	14	28	1	8	46	113	178	110	57	47	22	105	13	65	25	5	19

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF MIDDLESEX. Population, 48,313. Statistical Divisions.	DEATHS AT ALL AGES.							Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																	
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Scarlet fever	Measles.	Whooping cough.	Croup & Diphtheria	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Cranbury	6	3	5	14	16	....	44	1,651	....	2	1	2	......	1	......	3	10	4	1	3	4	3	2	2	1	......	......
East Brunswick	10	8	4	18	5	2	47	2,944	....	......	......	1	......	......	5	5	11	3	3	1	3	3	......	1	......	......	1
Madison	4	3	3	2	7	....	19	1,637	....	1	......	2	......	1	......	3	1	1	1	1	......	1	......	4	......	......	......
Monroe	8	8	5	12	9	....	42	2,450	....	......	3	1	......	1	......	6	7	4	2	2	2	2	......	4	1	......	......
New Brunswick	74	51	37	100	63	....	325	16,660	....	4	12	7	1	14	17	25	47	39	31	20	8	20	......	11	8	......	......
North Brunswick	4	1	1	5	4	....	15	1,155	....	......	1	......	......	1	......	2	3	2	......	1	......	......	......	2	......	......	......
Perth Amboy	17	16	9	20	14	1	77	3,770	....	1	3	5	......	......	2	12	5	14	7	2	4	4	......	7	2	......	......
Piscataway	8	4	3	10	12	1	38	2,802	....	......	......	......	......	......	1	3	1	9	1	6	5	......	......	3	1	......	2
Raritan	10	2	3	12	13	3	43	3,647	....	2	......	......	......	......	......	3	3	5	1	3	......	2	2	3	......	......	1
Sayreville	....	1	....	1	3	....	5	....	....	......	......	......	......	......	......	1	1	......	......	......	......	......	......	1	......	......	......
South Amboy	17	18	5	22	10	....	72	5,193	....	2	1	3	......	3	2	12	5	10	7	1	1	3	1	3	......	......	1
South Brunswick	14	5	2	13	12	....	46	2,699	....	1	......	......	......	3	1	3	7	2	2	2	2	4	......	3	1	......	......
Woodbridge	14	7	10	19	12	2	64	3,705	....	2	2	5	......	......	......	10	9	2	6	2	1	4	......	7	......	......	1
Death rate per 1000 for county	....	....	....	....	....	....	....	....	17.32	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities	....	....	....	....	....	....	....	....	16.17	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	186	127	87	248	180	9	837	48,313	....	15	23	26	1	24	28	88	110	95	63	44	30	46	5	51	14	......	6

COUNTY OF MONMOUTH. Population, 48,500. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Atlantic	1	1	1	3	11	......	17	1,653	......
Eatontown	19	10	5	12	7	......	53	2,573	......
Freehold	18	6	6	23	26	7	86	3,571	......
Holmdel	3	4	2	9	10	......	28	1,338	......
Howell	10	2	3	10	13	......	38	3,300	......
Manalapan	5	3	3	2	11	4	28	2,094	......
Marlboro	2	4	......	4	7	......	17	2,274	......
Matawan	11	12	6	25	13	2	69	2,875	......
Middletown	17	9	9	27	18	......	80	4,517	......
Millstone	5	2	3	7	12	......	29	2,091	......
Neptune	3	9	1	8	1	......	22	......	......
Ocean	54	28	20	35	28	5	170	6,109	......
Raritan	19	7	7	17	17	1	68	3,564	......
Shrewsbury	34	26	15	29	42	1	147	6,330	......
Upper Freehold	9	6	3	12	11	1	42	3,598	......
Wall	6	7	4	3	8	4	32	2,613	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	19.09
	226	136	88	226	225	25	926	48,500	......

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of child'n.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Atlantic	......	1	1	......	1	......	......	2	2	......	1	1	2	......	1	1	......	......
Eatontown	1	......	......	......	1	......	8	13	4	9	3	......	1	......	3	1	......	......
Freehold	......	1	1	......	3	2	3	12	11	4	9	8	6	......	3	3	......	2
Holmdel	......	......	......	......	......	1	2	2	4	......	4	4	1	......	......	1	......	1
Howell	1	......	......	......	......	1	2	4	9	1	1	1	3	......	3	1	......	......
Manalapan	......	......	......	......	2	......	1	6	2	2	2	......	3	1	2	......	......	......
Marlboro	......	......	......	......	3	......	1	1	2	......	......	3	1	......	1	2	......	......
Matawan	1	......	5	......	......	5	5	9	1	3	7	4	4	......	5	......	1	......
Middletown	......	2	......	......	1	1	9	12	8	10	6	4	4	1	4	1	1	......
Millstone	......	......	......	......	......	2	......	5	6	3	1	1	3	......	2	......	......	1
Neptune	......	......	2	......	3	......	3	2	3	1	1	......	......	1	2	......	......	1
Ocean	1	2	......	1	7	23	23	17	19	11	11	2	6	......	7	......	1	2
Raritan	2	......	......	......	4	4	6	15	11	3	1	3	3	......	5	1	......	......
Shrewsbury	1	1	2	......	4	6	15	20	22	4	13	6	6	1	12	4	1	......
Upper Freehold	1	......	4	......	......	3	3	9	3	1	......	......	2	......	......	......	2	......
Wall	......	1	......	......	2	2	1	3	6	3	......	2	1	......	3	1	......	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	8	8	15	1	31	50	83	132	113	55	60	39	46	4	53	16	6	7

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF MORRIS, Population, 49,019. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Boonton	11	2	7	17	16	......	53	3,570	......	......	......	2	1	3	1	2	10	5	1	1	4	8	......	3	1	1	......
Chatham	11	11	4	10	22	......	58	4,440		2	......	......	......	1	2	5	6	10	5	2	1	3	......	7	......	......	2
Chester	2	6	2	10	5	......	25	1,467	......	......	1	......	......	......	1	2	5	1	3	3	......	2	......	......	......	......	1
Hanover	12	8	1	41	35	7	104	3,624	......	3	1	......	......	1	1	4	12	10	4	4	1	36	......	6	1	......	......
Jefferson	2	7	2	11	7	2	31	1,740	......	......	......	......	1	......	2	3	3	2	3	4	......	4	......	4	......	1	......
Mendham	1	......	1	8	12	......	22	1,620	......	......	......	......	......	......	......	1	10	4	......	1	......	2	......	1	1	......	1
Montville	3	1	4	8	5	......	21	1,443	......	3	......	2	2	1	1	1	4	......	1	......	......	1	......	2	......	......	......
Morris	21	22	4	32	32	3	114	6,950	......	2	3	2	......	9	......	5	18	13	14	4	3	15	1	5	1	......	2
Mount Olive	3	2	5	7	8	......	25	1,760	......	1	1	1	......	......	......	......	2	5	2	2	......	1	......	2	1	......	......
Passaic	3	3	1	5	11	......	23	1,718	......	1	......	......	......	......	1	......	6	6	......	......	......	1	2	1	1	......	......
Pequannock	5	7	1	10	10	......	33	1,693	......	1	......	......	1	1	2	......	3	7	2	1	......	2	......	4	1	2	1
Randolph	37	28	21	20	11	2	119	7,576	......	1	......	20	1	1	4	13	12	10	17	......	5	8	......	1	1	......	3
Rockaway	32	32	17	30	19	......	130	6,826	......	......	1	4	3	1	18	10	12	20	16	4	......	10	2	1	3	1	4
Roxbury	6	14	4	12	13	......	49	2,157	......	......	1	......	......	......	4	9	5	3	3	2	......	4	......	7	......	......	1
Washington	1	2	2	4	13	......	22	2,429	......	......	......	......	......	......	......	......	3	1	1	3	1	5	2	2	......	1	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	16.91	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities	......	......	......	......	......	......	......	......	16.99	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	150	145	76	225	219	14	829	49,019	......	14	8	31	9	18	37	56	111	96	62	31	15	102	7	46	11	6	15

of New Jersey, for the year ending July 1st, 1879.

COUNTY OF OCEAN. Population, 13,707. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Berkeley	5	1	2	1	2		11	716	
Brick	9	9	7	17	13	1	56	2,463	
Dover	8	5	3	10	13	1	40	2,282	
Englewood	1			1	4		6	524	
Jackson	3	6		3	5		17	1,563	
Lacey	5	2	2	1	6		16	730	
Manchester	1	2		4			7	977	
Ocean	1	4	1	2	1		9		
Plumsted	3	1	1	8	2	2	17	1,508	
Stafford	3	6	2	8	6	3	28	1,045	
Union		2	1	4	3		10	1,396	
Death rate per 1000 for county									15.83
	39	38	19	50	55	7	217	13,707	

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Berkeley						2	1	2		1		1						
Brick		3			1	7	5	7	6	4	3	1	6		4			
Dover					1	2	2	8	6	1	2		4		2			1
Englewood												1			1			
Jackson			1				3	2	4	1		1			2			1
Lacey			1		1		4	2	3	3			1					
Manchester					1			1		2			1					1
Ocean			1					2	1	3					1			
Plumsted							1	3	4	1	1		2			1		
Stafford		3				5		3	2	2	1		1		3			
Union							1	2			1				1			
Death rate per 1000 for county																		
		6	3		4	16	17	32	26	18	8	4	15		14	1		3

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF PASSAIC. Population, 53,775. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Acquackanonk	5	2	....	6	8	....	21	1,631	....
Little Fall	2	2	3	5	4	....	16	1,457	....
Manchester	2	1	....	6	4	1	14	1,344	....
Passaic	35	31	15	24	19	....	124	4,883	....
Paterson	205	154	92	341	195	7	994	38,814	....
Pompton	5	7	1	11	25	1	50	1,544	....
Wayne	5	4	2	12	9	....	32	1,630	....
West Milford	3	5	2	13	13	....	36	2,472	....
Death rate per 1000 for county	....	....	....	....	....	....	....	....	23.93
Death rate per 1000 for county, exclusive of cities	....	....	....	....	....	....	....	....	19.58
	262	206	115	418	277	9	1,287	53,775	....

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Acquackanonk	......	......	1	......	......	......	3	1	4	1	3	1	......	......	1	1	......	......
Little Fall	1	......	......	......	......	......	1	3	1	......	1	......	1	......	2	......	1	......
Manchester	......	......	......	......	......	......	2	......	2	1	2	1	1	1	......	......	......	......
Passaic	1	1	2	1	......	15	18	10	15	18	6	2	4	1	5	1	1	1
Paterson	16	5	37	5	9	41	107	156	94	84	50	22	71	5	63	17	4	17
Pompton	4	......	......	......	......	......	2	4	9	1	4	3	6	......	1	1	1	2
Wayne	1	......	......	......	......	1	1	4	7	1	2	3	2	1	1	1	......	1
West Milford	1	......	......	......	......	3	3	8	5	......	6	......	3	......	......	2	......	1
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	24	6	40	6	9	60	137	186	137	106	74	32	88	8	73	23	7	22

Return of Deaths from all Causes and certain specified Diseases [illegible] *New Jersey, for the year ending July 1st, 1879.*

COUNTY OF SALEM. Population, 22,701. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Elsinboro	1	1	1	2	3	......	8	635	......	......	1	......	......	......	......	1	2	......	1	1	......	......	......	......	......	1	......
Lower Alloways Creek	2	......	1	3	6	1	13	1,398	......	1	......	......	......	......	......	1	4	3	1	1	......	......	......	......	......	......	......
Lower Penn's Neck	6	3	1	7	9	4	30	1,365	......	......	2	......	......	......	......	1	4	4	1	2	2	......	1	2	1	......	......
Mannington	5	7	4	3	8	......	27	1,930	......	......	1	......	......	......	......	1	3	4	4	1	......	4	......	1	......	......	1
Pilesgrove	16	8	10	13	20	2	69	3,276	......	......	2	2	......	......	1	9	9	8	3	2	1	8	......	6	2	......	1
Pittsgrove	5	......	2	5	3	......	15	1,684	......	......	......	......	......	......	......	1	7	......	1	......	......	1	......	1	......	......	......
Quinton	2	4	1	3	2	......	12	1,146	......	......	1	......	......	......	......	3	1	3	......	1	......	2	......	......	1	......	......
Salem	24	11	10	36	28	3	112	4,459	......	4	6	1	......	2	5	13	20	7	2	5	1	6	......	11	2	2	......
Upper Alloways Creek	7	1	4	7	11	......	30	1,816	......	......	1	......	......	......	3	3	5	2	......	1	1	3	1	2	1	......	......
Upper Penn's Neck	14	6	5	17	7	5	54	2,942	......	1	......	2	......	......	5	8	10	5	1	2	1	3	3	2	......	......	1
Upper Pittsgrove	5	2	......	7	8	......	22	2,052	......	......	......	1	......	......	......	......	8	......	1	1	......	1	......	2	......	......	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	17.26	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	87	43	39	103	105	15	392	22,701	......	6	14	6	......	2	14	41	73	36	15	17	6	28	5	27	7	3	3

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF SOMERSET. Population, 27,453. Statistical Divisions.	DEATHS AT ALL AGES.							Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																	
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup & Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive or intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bedminster	5	4	7	7	14	2	39	2,057	....	......	1	2	1	1	8	1	4	4	1	3	2	3	......	1	1	......	......
Bernards	8	2	7	7	14	1	39	2,618	....	......	......	......	......	......	4	4	4	10	3	2	......	3	......	3	......	......	......
Branchburg	3	2	....	2	10	....	17	1,288	....	1	......	......	......	......	......	2	1	2	......	1	......	2	......	2	......	......	......
Bridgewater	16	24	15	37	34	1	127	7,514	....	......	1	1	......	......	23	8	16	7	5	8	7	12	......	9	3	......	2
Franklin	13	9	8	16	17	2	65	4,040	....	1	1	......	......	......	8	7	4	7	4	1	4	7	......	2	2	......	......
Hillsborough	5	4	1	6	29	1	46	3,569	....	......	......	......	......	......	......	2	7	5	3	5	4	8	......	5	2	......	......
Montgomery	5	4	1	8	15	1	34	2,452	....	......	1	......	......	......	......	3	6	4	1	......	1	6	......	4	1	1	......
North Plainfield	7	4	2	18	13	1	45	2,818	....	......	1	......	......	......	2	2	10	5	3	2	......	8	......	2	......	......	1
Warren	3	2	1	3	8	....	17	1,097	....	1	......	......	......	......	1	2	3	2	......	1	......	3	......	2	1	......	......
Death rate per 1000 for county	....	....	....	....	....	....	....	....	15.62	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	65	55	42	104	154	9	429	27,453	....	3	5	3	1	1	42	31	55	46	20	23	18	52	......	30	10	1	3

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF SUSSEX. Population, 24,010. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Andover	2	....	2	8	7	....	10	1,184	....	.....	.....	.....	.....	1	1	.....	4	.....	1	.....	1	3	.....	1	1	.....	2
Byram	2	2	2	4	6	....	16	1,468	....	1	1	1	.....	.....	.....	.....	1	2	1	.....	1	2	.....	1	.....	1	.....
Frankford	5	1	....	3	10	....	19	1,784	....	1	.....	.....	.....	.....	.....	2	2	2	1	.....	1	4	.....	1	.....	.....	.....
Greene	1	3	....	6	3	1	14	840	....	.....	3	.....	.....	.....	2	1	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Hardyston	11	6	1	10	6	....	34	2,419	....	.....	.....	1	.....	4	.....	2	2	6	2	3	.....	1	.....	2	1	.....	.....
Hampton	2	....	2	2	4	....	10	990	....	.....	.....	.....	.....	.....	1	.....	2	1	2	3	.....	.....	.....	.....	1	.....	.....
Lafayette	4	1	1	6	8	2	22	853	....	.....	.....	1	.....	.....	.....	2	4	5	2	4	1	.....	.....	.....	1	1	.....
Montague	1	....	1	5	2	....	9	918	....	.....	.....	.....	.....	.....	.....	.....	4	.....	1	.....	.....	.....	.....	1	.....	.....	.....
Newton	11	5	6	5	10	1	38	2,483	....	1	.....	3	.....	.....	1	3	7	8	.....	2	1	2	1	2	.....	.....	1
Sandyston	2	2	....	7	8	....	19	1,200	....	.....	.....	.....	.....	.....	.....	.....	3	4	2	1	1	.....	.....	1	1	.....	.....
Sparta	4	1	5	6	9	1	26	2,155	....	.....	1	.....	.....	.....	.....	2	9	5	.....	.....	1	2	.....	2	.....	.....	.....
Stillwater	2	1	....	6	12	....	21	1,400	....	.....	2	.....	.....	.....	.....	1	2	2	1	4	.....	2	1	1	3	.....	1
Vernon	3	....	1	4	3	....	11	1,941	....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	1	1	2	.....	.....	.....	.....	.....
Walpack	3	3	4	4	3	....	17	632	....	1	.....	5	.....	.....	3	1	2	.....	.....	2	.....	1	.....	2	.....	.....	.....
Wantage	7	4	3	22	19	....	55	3,683	....	1	3	.....	.....	.....	.....	1	8	5	5	3	4	7	.....	6	1	.....	1
Death rate per 1000 for county	....	....	....	....	....	....	....	....	13.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	29	28	98	110	5	330	24,010	....	5	10	11	.....	5	8	17	54	40	18	23	13	26	2	20	9	2	5

Return of Deaths from all Causes, and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF UNION. Population, 51,758. Statistical Divisions,	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.
Clark	....	....	....	1	1	....	2	329	....
Cranford	4	1	2	2	2	1	12	1,110	....
Elizabeth	105	92	51	129	91	4	472	25,923	....
Fanwood	5	1	....	5	4	....	15	....	....
Linden	7	1	2	10	8	1	29	1,757	....
New Providence	4	4	1	5	14	....	28	838	....
Plainfield	29	24	12	31	32	2	130	7,216	....
Rahway	28	13	10	62	56	....	169	6,947	....
Springfield	4	4	2	4	5	....	19	810	....
Summit	2	5	....	6	2	....	15	1,489	....
Union	7	4	1	7	15	1	35	2,313	....
Westfield	10	7	3	6	14	....	40	3,026	....
Death rate per 1000 for county	....	....	....	....	....	....	....	....	18.66
Death rate per 1000 for county, exclusive of cities	....	....	....	....	....	....	....	....	19.27
	205	156	84	208	244	9	966	51,758	....

Statistical Divisions	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Acute brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Clark	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cranford	1	.....	.....	2	.....	.....	3	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....
Elizabeth	6	5	7	.....	5	48	47	51	56	49	22	19	38	4	24	8	1	.....
Fanwood	.....	1	.....	.....	.....	1	1	.....	4	.....	1	2	2	.....	.....	.....	.....	1
Linden	2	.....	.....	.....	1	.....	.....	3	4	1	3	1	1	.....	4	.....	.....	1
New Providence	1	.....	1	.....	.....	2	.....	3	2	.....	2	.....	4	2	1	1	1	.....
Plainfield	1	1	4	.....	1	3	16	17	17	19	6	6	13	2	4	3	.....	.....
Rahway	4	1	.....	2	.....	.....	11	32	17	13	11	6	10	3	9	5	1	.....
Springfield	4	.....	.....	.....	.....	1	1	2	4	4	.....	.....	.....	.....	1	.....	.....	.....
Summit	2	.....	.....	.....	.....	1	4	2	2	.....	2	1	1	.....	.....	.....	.....	.....
Union	1	.....	3	.....	.....	.....	3	2	4	.....	3	2	4	.....	2	1	.....	.....
Westfield	.....	2	.....	.....	.....	1	5	2	5	6	1	2	6	.....	2	.....	.....	.....
Death rate per 1000 for county	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1000 for county, exclusive of cities	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	22	10	15	4	7	117	91	117	118	102	53	39	79	11	47	18	3	2

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

COUNTY OF WARREN. Population, 37,389. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1875.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism	Puerperal.
Allamuchy	4	1		4	5		14	700		2							3	3	1			8					
Belvidere	8	1		13	10	1	33	1,744								3	4	7	1	1		5	1	2	1	1	1
Blairstown	2	1	2	6	10		21	1,453		1					1		5	1	1		3	1		2	2		
Franklin	4	1	1	4	7		17	1,637							1	2	1	4		1	1	1		3			
Frelinghuysen	2	3	1	1	4		11	1,175								2	2	2	2	1							
Greenwich	8	8	1	7	17	2	43	2,728		2		2			3	5	6	8	5	1		7					
Hackettstown	9	3	6	12	10	1	41	2,706		1					1	7	8	8	2	3	1	1	1	2			1
Hardwick			3		1		4	592							2							1					
Harmony	2	2	1	7	9		21	1,384		1						1	2	2	1	1	1	4		2			
Hope	3	1	1	7	5		17	1,558		1						1	4	3	1	1	1		1	2			
Independence	4	3	1	3	6		17	1,029		1							1	3	2	4		2				1	
Knowlton	4	3	4	6	14		31	1,672			2	2			4	1	3	3	1	1	1	1		4	2		
Lopatcong	3	4	1	4	3		15	1,590			1	1					3	3	2	1		1					
Mansfield	8	3		9	14		34	1,847			1					3	5	3	2	2	3	3		2	3		
Oxford	13	4	1	6	15	1	40	4,186			2			1	2	6	6	6	1			5		1			
Pahaquarry	1		1	2	1		5	411		1		1						1				1			1		
Phillipsburg	36	12	11	35	7	1	102	7,240			3	6			5	10	13	8	4	2		7		6	1		2
Borough of Washington	10	5	4	10	6	1	38	2,320							1	4	5	8	3			2	2	2	2		
Washington Township	5	2	1	7	5		20	1,417			1					2	6	2	1	1	1			2			
Death rate per 1000 for county									13.98																		
Death rate per 1000 for county, exclusive of city									13.93																		
	126	57	40	143	149	7	522	37,389		10	10	12		1	20	47	77	75	30	20	12	45	5	30	12	2	4

Circular of the New Jersey State Board of Health as to Sanitary Appliances.

In the practical application of Sanitary science, it has become necessary to use very many appliances, both for convenience and to guard against evils incident to household or city life. These have become far more numerous and useful than is generally known. To afford the citizens of this State a better opportunity for becoming acquainted with their merits, both by personal examination and by the opinions of experts, we have conferred with officers of the State Fair of New Jersey, and, as a State Board of Health, shall aid in an exhibition of sanitary appliances therewith. This Fair is held each year, only a few miles from New York City, and near the direct route to Philadelphia and to the South and West. The attendance from this and other States is very large, and it affords the best opportunities for familiarizing the people with valuable improvements. It opens yearly about the middle of September.

Specimens may be sent either as competing for premiums or on exhibit. Any articles sent from abroad may be consigned to our care, through Morris's Express, 50 Broadway, New York, or through other agents. Every article exhibited should bear a descriptive label, containing detailed information respecting its construction, its use, and the retail price and place at which it can be obtained. There is no charge for space. The small cost of conveying goods to and from the exhibit must be borne by the exhibitors themselves. The articles must bear the names of the owner or the agency exhibiting it. Articles sent for exhibit in our care should be directed "New Jersey State Fair, Waverly. Care of New Jersey State Board of Health."

The State Board of Health has commenced at Trenton, the capital of the State, a museum of sanitary appliances, to which any owner or manufacturer may present the articles exhibited as the property of the State, for permanent examination and exhibit. Or they will by us be directed to the persons or agents with whom they are to be left.

By order of the New Jersey State Board of Health.

EZRA M. HUNT, M. D., Sec'y.

Trenton, N. J., July 7, 1879.

Letters of inquiry may be addressed to E. A. Osborn, C. E., Middletown, N. J., or to State Board of Health, Trenton, N. J.

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GENERAL INDEX OF SUBJECTS.

INDEX.

GENERAL INDEX OF SUBJECTS.

ALPHABETICAL INDEX.

ADDENDA.

The headline on page 27 should read "Government of Towns," instead of "Government cf Forces."

FOURTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY,

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CAMDEN, N. J.:
PRINTED BY SINNICKSON CHEW.
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REPORT OF THE SECRETARY OF THE BOARD

To His Excellency, George B. McClellan,

GOVERNOR:—On behalf of the State Board of Health of New Jersey, I have the honor to present to your Excellency a brief survey of the work of the Board for the past year, and such accompanying statements, papers and reports as bear upon the vital conditions of the people. The increase of duties assigned to us by the last Legislature, the formation of very many new local Boards of Health, the occurrence of several endemic diseases and the inquisitive spirit manifested as to various matters of health administration, have required, as never before, our active attention. The law which requires local Boards of Health to be formed, has resulted in a large increase of interest in local health administration. Subjects of the utmost importance to our citizens are thus locally discussed and public opinion is educated by the information which is sought and secured from various sources. One of the designs of this Board has for the first time been fully realized, the past year. Its advice has been sought in many measures of local interest, so that the service the State is thus doing has come to be appreciated, both in the interests of health, and the prosperity that so much depends thereupon. The local reports we are receiving, enable us to estimate the general condition of the population, while the vital statistics are giving us records of precision as to the courses and causes of disease. In nearly all the localities that most need it, there are now those who have an intelligent conviction of many things needing to be done, and who are seeking to make that public opinion, which must ever preceed, or to a reasonable extent accompany, legal enactments. Foundations are being laid for a careful, systematic and faithful administration of those public affairs which have to do with the most vital concerns of our population.

While we have to regret the occurrence of some endemic diseases of a fatal character and a wide-spread extension of periodic fevers, yet the prevalence of serious or fatal disease was much less than for the period of our last report. The returns made up from July to July of each year show a less number of deaths by about twelve hundred than the previous year. While localities have suffered, there has been no wide-spread, fatal epidemic. The study of health questions is becoming organized into a system. From many of our cities and from some county and village localities, we have evidence of a comprehension of the necessities of a close watchfulness over the causes of disease, with a view to their prevention or abatement. It is no longer viewed as merely a professional matter, but as one which concerns the industrial welfare of the people. The advice of the Board is often asked in matters of local health administration, and we have thus been able to aid local authorities. We are now fairly in the position for a comprehensive oversight of the health interests of the State, and will be able to indicate how those evils are to be guarded against, which most imperil the life and health welfare of our citizens. Much information in this direction is diffused by the annual State report, as well as by personal correspondence and other agencies which we are able to promote. The library of the Board now presents a good outline of the various subjects of sanitary science and art, and we trust ere long to make it more extensively accessible to the people. Specimens of maps and other appliances also serve as models for the work necessary to be done by many of our cities and some of our closely settled rural districts. The wide duties imposed under the present law have brought us more in contact with localities and enabled us to indicate the most pressing wants. Requests are frequent for the presentation of these subjects to public attention, in connection with Teachers' Institutes and by Local Boards.

It has been our plan, in connection with the report of the secretary, to fully consider some one of the more prominent prevailing diseases of the State. Last year periodic or other malarial diseases were considered.

DIPHTHERIA

Has been, for several years past, so prominent and fatal a disease in this State, that it merits our most careful and inquisitive investigation. It has taken its place as fourth in the English list of zymotic diseases and is equally prominent in our own bills of mortality.

The order of diseases known as *zymotic* gets its name from the Greek word which means "causing to ferment," because such diseases were regarded as somehow allied to or as cperating through such a process. While we cannot accept the term as defining the modus operandi, there is need that the various laws of fermentation be studied as in nature, as allied yet distinct and as related to animal or vegetable organism. Also that we study especially putrefactive ferments or putrefaction as distinct from usual fermentation, since it is toward the latter that many of the zymotic diseases seem to incline. "There are two species or groups of fungi, the yeast or ferment plants, and the putrefactive fungi which are developed during the process of putrefaction." Parkin, p. 29.

As these diseases are alike, in that they are believed to depend for their inception upon infective particles derived from without, such questions as these are opportune.

How can the production of the infective be prevented? If not prevented, how can exposure to it be avoided or lessened? If there must or may be exposure, how can the sedation or location of the particle in the human system be hindered or embarrassed? If likely to find some local lodgement, how can the part be put in such a condition as to fortify against it?

Or can there not be some substance introduced into the blood or secretions and for a time maintained there, that will render the system refractory to the process which the infective particle would otherwise set up, and which thus constitutes the disease?

If the gravity of the disease depends upon some chemical or decomposing changes which could be held in abeyance, or on the rapid multiplication of vegetable or animal organisms, which mechanically or otherwise cause a higher life to succumb to such prolific invasion, is it not possible to prevent the setting up of such processes by antizymotics or antiseptics.

The discussion of these points, however pertinent to any one of these diseases, can not now be entered upon at length, but they are to be thoughtfully borne in mind. If the ideas entertained by us as to these epidemic diseases, and their possibility of limitation and prevention by individual sanitation are correct, the future success offered to medicine is as much beyond the one limitation of small-pox as the application of a general life-preserving law is beyond the prevention of only one disease.

Diphtheria first found its record in the registry of the Registrar General of England, in 1855, as separate from scarlet fever, of which it before had been recognized as somtimes a complication. About the same time it began to attract attention in this country by an occasional outbreak. The first article as to it in the New York State Medical Transactions was in 1859.

In a full report of the diseases of Newark for the year 1858, in the New Jersey State Medical Transactions, it is not named.

In January, 1859, the reporter for Essex county says: A few sporadic cases of diphtheria have occurred, "some fatal, all very severe and demanding very careful treatment."

The State report made January, 1861, says: "The reports received by the committee notice, in every case, diphtheria as epidemic to a greater or less degree. It has been most prevalent in Essex, Hunterdon, Cumberland and Gloucester.

Ever since, in varying degrees of prevalence, it has found its place among the most serious yearly diseases with which we have to contend.

The number of deaths cannot be accurately stated, as returns from localities were often defective. Under the recent law, the more completed registry shows eleven hundred deaths from July 1st, 1878 to July 1st 1879, and the vital statistic report shows the deaths from July 1st, 1879 to July 1st, 1880. It far exceeds at present, in fatality, any of the communicable zymotic diseases. It is universally recognized as belonging to the class of ailments dependent to a large degree upon preventable causes.

Whether it is an old disease, reeurring in its cycle, or recurring because, by other methods, we are imitating the filth of ancient civilization and over-crowding, it is not easy to determine. The general view is that it is the recurrence of a disease heretofore

described. In the identification, we find many descriptions of sore throat which are only analogous and strained into identity.

It is no more surprising a thing that a new disease should occur than that a new chemical compound should be discovered, or that life under new disturbing conditions should functuate varied phenomena. Although finding mention in the supplementary table of the causes of death in England in 1855, it does not receive extended notice from General Graham until 1858.

"Diphtheria," says he, "according to the popular theory, is bred in France—where the conditions are more favorable on the whole than they are in England—to the diffusion of putrid effluvia over the fauces.

Every Englishman admires the works of art, the picture galleries, the houses, the furniture, the cultivated personal tastes which surround him on every side in Paris, or on a small scale in Boulogne; he admires some of these objects every day, others every week; but has every day to give up his admiration at the door of that inscrutable *cabinet*, where the light of French refinement never comes; where his throat is assailed by the poisonous distillations that engender disease, and explode—if you count well the victims—with much more fatal consequences than gunpowder, or even than fulminating quicksilver. That men should lock up jewels in cabinets, keep their larders full of delicacies, or stock their cellars with wine, is natural; but it is a singular absurdity in civilized countries for men to attempt to hoard for years this volatile essence, which bursts its chains, and, like an unclean spirit, enters not only every apartment in the house, but every channel of access to the living chambers of the body, leaving at times such traces of its passage as diphtheria in the throat.

The disease once generated, wanders abroad and destroys life under circumstances quite different from those in which it was born; but impurity is always its natural ally.

The Scotch threw these matters into the streets, and justly incurred the censure of the fastidious.

In London, and even in the country mansions, retreats still exist which may rival the French magazines of impurity, but it has of recent years, been the practice to throw the guano compounds of London, with water, into the sewers; which, though not constructed for the reception of such matters, and consequently suffering

their volatile principles to escape into the streets, convey a portion of their elements to the Thames, and commit them to its flood of tidal waters.

Dr. Barker has recently performed an ingenious series of experiments on animals, to determine the effects of each of the noxious principles which arise from cesspools. He placed the animals in a close chamber by a cesspool, with which a tube opening into the chamber communicated; and a lamp was arranged so as to draw a current of cesspool air steadily over the creatures inside. With a pair of bellows, Dr. Barker could draw the air from the chamber.

A young dog in half an hour became very uneasy and restless; he vomited, and had a distinct rigor, and in the course of a day was exhausted.

When he was removed he soon recovered. "Another dog was subjected to the cesspool air during twelve days; in the first seven days he underwent a series of sufferings, not unlike the symptoms of the diseases of children in hot weather; on the ninth he was very ill and miserable." After he was liberated, on the twelfth day, he remained "very thin and weak for six weeks."

Dr. Barker then continued his experiments on the effects of definite doses of the gases in the sewers, and killed or poisoned several sparrows, linnets, jackdaws and dogs.

Thus, Dr. Barker has, for our instruction, imitated on a small scale, and on a few of the inferior animals, the vast experiment which is constantly going on, and destroys thousands of men, women, and children in all England.

Instead of a few animals in a close chamber, more than two millions of people live in London over sewers and cesspools. The poison is generated in every house; it is distributed conveniently along all the lines of road, so as to throw up its vapors into the mouths, throats, and lungs of the people through innumerable gully-holes, which are either left untrapped or trapped imperfectly, in order that the poisonous gases might escape. A variation in the pressure of the atmosphere draws up the stinking air from the sewers, like Dr. Barker's bellows.

All the details of the experiment were as carefully contrived by the engineers of the old sewers' commissioners, as if they were constructing an apparatus for passing currents of poisonous

airs steadily over the people of London, with a view, like Dr. Barker, to ascertain their exact effects.

The engineers of the new Board of Works have endeavored to keep the apparatus in order. It is now time that this cruel experiment should cease. Last year, when no epidemic prevailed, not less than 14,795 unnatural deaths were registered in London. This was the aggregate effect of the impure airs, and of other sanitary defects."

The criticism is severe but in many regards sustained by continued experience, and still applicable in this country.

Since these utterances were penned very many attempts have been made to identify the "infective particle" of diphtheria, or to define the precise conditions under which its exciting cause is generated. It is not surprising that science and art should still fail to identify it, but this does not vacate the value of much knowledge we have acquired as to this disease. It is distinct from the usual eruptive diseases and has a marked septic character.

Each year has given increased conviction, that it does not, after having been started from a focus, acquire epidemic prevalence without the aid of foulness derived from household conditions. It is still a careful study with physicians whether it has chiefly to do with putrefaction and excretal charges—especially the excretion of human beings—whether it arises from sewers or from refuse from which all human execretion have been excluded, and how far dampness or excessive stagnant moisture may cause the special production which gives rise to this disease. Although more than most of the crowded-life diseases, it prevails in the country, yet when thus occuring it is frequently fostered by local conditions, or its introduction can be traced to a foul source.

Tyndall has shown that the countless myriads of motes that are seen dancing in every sunbeam are organic particles, and that among them are zymotic bodies which are germs of disease. These bodies are in concentrated force in the rooms occupied by persons suffering from such a disease as scarlet fever and we are always to seek dilution, ventilation and isolation.

We can therefore emphasize a sentence already quoted—"The disease once generated wanders abroad and destroys life under circumstances quite different from those in which

it was born; but impurity is always its natural ally." If the congener of its development is a sporule, or an animalcule, or only an undefined molecule, it may light upon any soil; but if surroundings are good and the person in good condition of life, the rule will be that it will seldom display vigor and virulence, and under such relations can never acquire epidemic momentum. Where there is large production of infective material from excessive and extended foulness "we may conceive the different kinds of zymotic matter distributed in clouds," and that like strata of air or emanations from factories these may have their floating direction governed by specific gravity by trees, by winds, by the humidity of the atmosphere, and thus different localities be differently exposed. But be assured where the local conditions or those of the individual are favorable—there the chief outbreaks will occur.

So far as diphtheria is concerned, the present showing and summing up of all evidence is that it takes its place among the diseases nurtured by filth incident to human habitations, upon moisture and heat co-operating therewith, and that the first principle of its limitation is to avoid these. While it is sometimes derived from persons, or conveyed by things, and thus communicable, the weight of opinion is that it at times springs up as a product amid unsanitary conditions, without a previous case or emanation therefrom.

Next, it may be said that it is not believed that diphtheria occurs frequently, if at all, from impure water, as do some of the zymotic diseases, or that it is especially conveyed by the discharges, as is believed as to cholera and typhoid fever. It is more essentially a foul air disease. It is also one of those foul air diseases which is believed especially to choose the fauces and surrounding membrane for its first display of unhealthy activity. "It thus infects the moist surfaces of the throat," and is conveyed into the lymphatics, and reaches the blood; many regard it as local, before it is constitutional in its action, and believe that protection is afforded by avoiding open inhalation through the mouth and by protecting the surface of the throat, from its sedation by astringent or antiseptic substances.

If, however, the blood is primarily or contemporaneously affected, prophylaxis now seeks to put it in a condition un*friendly* to the setting up of the disease process. Barker speaks

of the anti-hyogenic effect of quinine. Laudor Brunton in his late work on "pharmacology and therapeutics" says "facts all seem to point to ferments or enzymes as the agents by which the tissues are built up or pulled down." * * The action of drugs upon these is becoming one of the most interesting questions in pharmacology."

It is claimed by many that "diphtherite" as a process is a factor in many diseases and that what we call "diphtheria" is only distinct in that it manifests itself so primarily as to give this specific name. Thus Martin, of Berlin, after defining the diphtheritic process as consisting of a "fungous formation the spores of which are seen under the microscope to penetrate not only into the tissues but within the blood vessels producing in the way a generalized disease," claims that even in puerperal fever this is the predominating element. Diphtheritic deposits have been long recognized as occurring in scarlet fever, measles, etc. It is not certain but that we are to study classes of disease and their allied traits much as the botonist does plants—which, although quite different, yet admit of association and of explanations even when great variations of type or hybridisms occur. Diphtheria as less often traceable to antecedent cases, as well defined in its prominent symptons and as traceable in some of its blood and tissue changes, may well form the nucleus for close study into the etiology and prevention of zymotic diseases. Cleanliness, avoidance of all putrefactive decompositions, attention to the mould or fungoid producing moisture of foul air and foul water in buildings and preventive treatment of individuals are capable of greatly diminishing this insidious disease.

LOCAL EPIDEMICS, ETC.

In the enteric or typhoid fever at Princeton, the periodic and other malarial troubles of Bound Brook, and the small-pox of Camden, we have this year had three typical and impressive reminders of the evils that can result from avoidable diseases.

The mournfulness of death in educational institutions among those in the vigor and promise of early manhood; the depression of an entire population, and much suffering among the laboring classes, and the excitement of a loathsome contagion have each

in their way shown how melancholy and how pecuniarily unprofitable are the self-imposed burdens of avoidable sickness.

As the sickness at Princeton is made the subject of a separate paper we need not enlarge upon it here.

PERIODIC FEVERS OR "MALARIA."

In our last report, pages 18—25, under the division of Miasmatic Diseases, we gave special attention to that prevalent form of disease, whose periodicity is most distinctly declared in the form of "chills and fever."

It is unfortunate that the terms malaria and miasm, as frequently used, do not convey any distinct idea of the disease thus sought to be designated. In the nomenclature of the Royal College of Physicians, London, as reproduced in the United States Government publication, of the "Nomenclature of Diseases," which has been accepted thus far as the basis of our nosology, the term "Miasm" does not occur, and the term "Malarious," only as a definition of "Remittent Fever," a fever characterized by irregular repeated exacerbations, the remissions being less distinct in proportion to the intensity of the fever.

In the classification of the Registrar General of England, under the class of zymotic diseases miasmatic diseases are named as Order 1st. Under the order are associated nineteen diseases, the last being left indefinite under the title of "Other Zymotic Diseases." Ague and remittent fever appear as 16th and 17th in the list. In this classification miasmatic is used as the name of an order in its etymological and general sense, as meaning "a noxious particle or substance or exhalation floating in the air," which has become a cause of disease. Physicians when rightly using the term "malaria" do not use it in its derivative sense as a term for foul air in general, but as denoting "an exhalation from marshy districts producing fever or disease of an intermittent or remittent type." "It is believed to be the product of organic decomposition in soils," in which heat and moisture are important factors. From the fact that it seems to be generated in the greatest amount in marshes containing vegetable organic matter undergoing disturbed or uncompensated decomposition, it is often called marsh miasm.

While the term "miasmatic" may be employed to denote all

the forms of "foul air" or "infective particle" diseases, the term "malaria" should never be used in the lax sense it is by the laity and by too many physicians. If it is to mean anything distinctive and descriptive it must be confined to the class of diseases to which we have referred. There is increasing evidence that this malaria produces its own specific effects, and that to a great degree its production is due to causes which are within the range and the duty of human control.

Nature has its own processes of decay and its own compensations, so that the undisturbed great Dismal Swamp of Virginia, for instance, is not known as a cause of malaria. But when art substitutes something else for the exuberant vegetation of nature, or impedes natural water courses, or adds to the products of decay, or disarranges the relations of heat and moisture thereto or in any other way introduces its own methods, we must see to it that we provide for the changed conditions. It is now well understood how decomposition, the level of ground water and the heat of the ground, can be affected by artificial methods, how, where there cannot be immediate relief, we may prevent exposure and how we may fortify the system against attack.

It is fast coming to be understood by our leading students of social science, how neglect or remedy of evils that affect public health bear on the financial prosperity and general condition of the people. Much more is now known as needing to be done than is executed. The causes are abatable, although sometimes difficult of abatement. The time is not far distant when land and water rights and privileges will need to be guarded in the interests of public health, for the public good, just as property is taken for railroad and other improvements. While the strict forms of law and adherence to public rights must ever be recognized, regard for the general health must be held equal to that exercised for other material interests.

Never, more than in the last year, has evidence come to the Board, that malaria is dependent on local causes, which to a great degree admit of abatement. The mildness of the last winter, and the unusual heat and dryness of the spring months seem to have stirred into unusual activity the processes of vegetable decomposition, and so in many places to have added to the prevalent sickness.

Various localities in the State have given new evidence of a

continuation of unhealthy emanations long since realized. We have no experience not common to parts of other States except that our rapid growth, our centralization in towns and our many works of public improvement, cause more disturbance of natural conditions. Cities like Camden and Burlington have been greatly relieved as to malarial tendencies by improvements in drainage, while other cities have increased rather than diminished their impediments to a dry and cleanly soil.

Ewing township, in Union county, appealed to us in a case which seems plain. An unimportant saw mill site is the cause of the inundation of a considerable section in the township. On an appeal made to us by the Board of Health of that township we made careful examination of the district and also secured facts in detail as to the sickness and its localities. These were furnished with great precision and with corroborative evidence. At a meeting of the Township Board, held in Trenton, full conference was held with the Secretary as to the means to be used for relief. It is recognized that some defects exist in our laws as to the securement of drainage for health, and is believed that where clear evidence is afforded of prevalent damage in this respect the law should provide means of relief.

The following is part of a letter received about the same time from the Cashier of the Bank of New York, resident at Belleville:

NEW YORK, July 23, 1880.

A. W. ROGERS, M. D.,

President of the State Medical Society.

Dear Sir :—Having lived for several years at Belleville, and suffered from malaria in my own family, I have been led to observe the influences which produce or aid in the dissemination of malaria, and I have observed that the prevalence of diseases of that nature, (to a large extent), depends on the condition of the water in the various mill or factory ponds. And I have observed that the drawing down or emptying of the ponds for repairs to dam or other purpose, during the summer time, has been followed by a wave of chills and fever or typhoid. Last season the old Birds' mill pond, (you may know it), was drained during the hot weather, that the Newark Aqueduct Board might lay their pipes across. Immediately after, the lower Hendricks pond was partly emptied to repair the Montclair Railway bridge; the effect was evident in increase and spread of malarial

disorders. Two years before, the upper Hendricks pond was emptied and the locality of Montgomery was a prey to malaria. There is no doubt in my mind that the improper use of the water-courses and ponds is largely the cause of the reputation of New Jersey for malaria &c., and it does seem to me that it is a proper subject for legislation.

BOUND BROOK.

The condition of the beautiful village of Bound Brook has become so well known, that we are in no danger of injuring its best interests, by speaking plainly of its deplorable experience. About July 27th, we received the following note from one of its physicians:

EZRA M. HUNT, M. D., METUCHEN, N. J.

My Dear Doctor:—Bound Brook is certainly in a very unhealthy condition. On Main street there is but *one house* which escapes from malaria in some form—and this is simply a fair sample of the whole town. Chills are frequent—fearful neuralgia more so—but the fever predominates. The street on which I reside, the best drained and located on a small hill, I do not believe one man, woman or child escapes, except by leaving town. When I say I believe, I mean I have been unable to find a single exception to the statement. Now my object is to see if I cannot persuade you to visit this place, show you its plague spots and see what can be done for it.

Respectfully yours, &c.,

C. M. FIELD, M. D.

BOUND BROOK, N. J.

A visit the subsequent day and a careful examination, not only of the one chief marsh, but of all surroundings convinced us that there were local causes of disease of the most serious character. Changes caused by the alterations of roads, building of railroads, gradual obstruction of water-courses and the accumulation of decayed and decaying vegetation had attracted attention before. The previous summer, the increase of intermittents and remittents had been so great that complaint had been made before the grand jury, and before the sickness of this summer, an indictment of the chief marsh as a nuisance, had been made.

Not long after our first visit, the State Board of Health was asked to be informally present at a meeting of the Township

Board of Health and of the citizens, held for the purpose of producing evidence that might satisfy the Township Board that this marsh needed to be reported by them as a nuisance. Although it was not necessary that our Board should formally meet, and as at this stage of proceedings it had only an advisory and individual relation, three or four members of the Board were present.

The proceedings were conducted in a deliberative way and full opportunity afforded to get at the facts as to the prevailing sickness and as to its causes.

Every physician of the town testified to the due extent of the evil and agreed as to its causes. The most prominent citizens declared that unless there was an abatement of the evil, property interests could not induce them to remain as residents.

Whole families of laboring men prostrated, business paralyzed, all that could get away seeking relief by flight, and a kind of testimony irresistible, both as to the facts in evidence and the character of those offering it, made out a case of malarial poisoning so oppressive and universal, as to furnish such a typical example of concentrated malarial poison and of its saturating effects as deserves to form a whole chapter in the future history of periodic fevers, due to localized and artificial causes. Gen. Viele, after a careful inspection of the whole precinct, declared it to be the worst exhibit of a malarial manufactory that he had ever witnessed, and worse than anything known this side of Africa. Assertions that had seemed to us extravagant were fully verified by what we saw and heard, so that I believe every member of the Board felt fully convinced of the severity of the visitation and the reality of its alleged exciting causes. Even in July, all through the pond, there were patches of dead vegetation, not even the water lily being able to withstand the alternations. The mild winter, the heat of early spring, the alternation of water and of exposure of the bottom of the marsh, with its decaying mass, to the action of hot suns, made an effluvium so sensible at nights, and often in days of humid atmosphere, as to be fully certified by the community at large. It was a "macerating reservoir of vegetable substances, causing those pestiferous exhalations to which intermittents in all their grades and varieties have been obviously traceable." *While* no doubt other evils exist, this marsh and its tributaries

were the chief cause. While this does not inculpate the present owners, since they do not seem intentionally to have created the evil, yet it did show that the equity of law should somehow reach the evil before another summer comes.

The local Board of Health, under the act of March 12th, 1880, declared the mill-dam a nuisance, and ordered its removal in November. In the meantime, a second complaint was made before the grand jury of Somerset county, and a true bill found. The case came up for trial at the fall term and occupied the court at Somerville for ten days. It will ever be a notable trial in the history of New Jersey sanitary legislation. The owners of the land made a most vigorous defence, with the aid of some of the ablest counsel of the State. The Prosecutors showed a universality of sickness such as we believe has never been exhibited in any such trial. No person of the vicinity could be found to testify exemption. On the former trial it was shown that one man had not been sick, and that an old man and his wife, who usually retired soon after sunset, had escaped. On the second trial it appeared that these three had since all been down with remittent or intermittent fever. Attempt was made to show that the malaria at Bound Brook was a part of the general prevalence of this malady; that there were other operative causes; that the water of the pond was not harmful, but that the wells might be. The verdict of the jury sustained the indictment of the grand jury. The case fully shows that law must in such flagrant cases protect the health of the citizen, and that even ownership in real estate is not so precious as the lives of the people. As it is desirable that no private property should be confiscated without award, and also that it should not become a public nuisance, we submit, that drainage for health should be recognized in the State of New Jersey. The law does not hesitate to provide for drainage of land for benefits to agriculture, or to condemn one's private property when it is wanted to build a railroad, or to widen its tracks. This is right. But it is also right that under the same restrictions, or the same provisions for equitable appraisement, mill-dams or marsh lands, which are notably unhealthy, should admit of similar condemnation, under provisions fair alike to owners and to the general public. Surely the public interest requires that whole communities should not be prostrated as a result of such

artificial marshes as that which fully suspended the prosperity of this growing town.

The defendant was directed to abate not only the mill-dam, but to remove all the obstruction that had caused the nuisance. And it is being promptly abated. The details of the trial, the evidence, the pleadings, and the charge of the Judge, are worthy of permanent record.

There is very great need, in many localities in this State, of drainage for health, and there is need of such legislation as, while it guards personal rights, should make it as possible in behalf of the public health for the Supreme Court to condemn land for this, as it is for other public interests.

Extracts from the reports of local Boards of Health will indicate various localities where "malarial" diseases have occurred. While climatic conditions have favored so wide-spread a prevalence, it will be found that many localities have been exempt, and that those regions have suffered most which have long been recognized as in the vicinity of unhealthy swamps or low grounds, filled with vegetable refuse.

We also call attention to one of the reports from a local Board, of a peculiar endemic fever which occurred near Blackwoodtown, and is believed to have been caused by putrefactive composts, brought there for fertilizing purposes.

See reports of local Boards.

THE ELIZABETH NUISANCE.

Early in the year our attention was directed to a nuisance that existed between Elizabeth and Elizabethport, in the case of an establishment for the recovery of sulphuric acid from the refuse liquors left in the refining of kerosene oil.

In the separation of the kerosene much sulphuric acid is used. The thick liquid left consists of various nauseous hydrocarbons or complex oils, in connection with the sulphuric acid. The whole is known as "sludge." This was brought to a dock and transferred to vats and retorts, and by a crude process and by imperfectly conducted works the acid was separated. The result was that the fumes of sulphuric acid and a floating vapor, composed of various of these petroleum compounds, was diffused a great distance. In certain states of the atmosphere it

did not seem to mingle with the air, but to be carried along through it as if a distinct and unmingling substance. Recently an author has attempted to show that the reason of the heavy fogs of London is partly to be found in the fact that the similar atoms given off from various factories become coated with an oily pellicle and so are prevented from oxidation and from ready mingling with the atmosphere. Whatever may be the reason it is certain that some vapors do not readily submit to atmospheric dilution and are to be studied as to their resisting constituency.

At least it was certain as to this vapor that it was a great annoyance to the whole district in which the distillery works had been started. In very many, beside discomfort, it produced a sensation of oppressive breathing and nausea, and it was claimed that in others it caused headache, diarrhœa and other serious sickness. There was the usual difference of view as to whether it was absolutely harmful, and at one time it seemed as if a long litigation would ensue on the point whether it was a nuisance injurious to public health.

Although the present English law, in its definition of a nuisance injurious to health, includes such permanent odors as unpleasantly affect large masses of people, and are found to nauseate or distress large numbers of persons, yet our own courts have heretofore been exact in their requirements as to proofs of actual evil effects to the human system.

But the case in hand illustrates the present tendency to pay due regard to the public health, to consider all alleged interferences therewith. Public opinion was earnest and outspoken in condemnation of the evil. The physicians of the district very unanimously expressed their opinion that the vapor was unfavorable to health. The Secretary of the State Board of Health was requested to make a full examination of the works and an inquiry into the effects, and of the vapor.

At the same time an indictment was sought from the grand jury, and an injunction from the higher court. The case was fully presented and finally an indictment secured.

The Chancellor also appointed an expert commission for the purpose of examining into the alleged nuisance, its effects on public health, and whether it could be remedied so as to permit the continuation of the works. The result of the examination

was such as to satisfy them of the imperfection of method and the evils arising therefrom.

The owners are experimenting on methods, in order to satisfy the committee of experts. The nuisance will be abated. The case seemed to illustrate three or four important points:

I. The power of intelligent public opinion, when it is freely expressed, is persistent and adapts right methods for the accomplishment of its object. Much failure in removing nuisances that is attributed to the imperfection of law, is due to a defective public opinion, a feeble or defective expression of it or a resort to methods which are unwise and indefensible.

II. The tendency of law to conserve the interests of public health. The case was acknowledged to be one difficult of proof by the closest tests of chemical analysis, or by testimony as to the effects of such vapors in dilution. But the exact testimony of personal experience was found to be definite enough to overcome all this. Although some of the decisions of courts, several years since, seemed discouraging as to the definition and abatement of nuisances, it is evident that now both public opinion and law incline to regard the protection of the public health as a frequent and definite duty of the State. The Attorney General in his opinion on a law passed by the last Legislature and referred to him for direction as to one of its clauses, after giving a construction thereto, governed by the intent rather than the technical wording, says: "If the law was not a sanitary measure, it might be questionable whether it would bear such a construction." The same spirit is manifested in both State decisions and municipal ordinances. Law is both being made and executed which, while regarding private rights, recognizes the fact that the health of the people is a supreme law.

III. It showed how crude and imperfect are many of the processes now carried on to the discomfort of the public.

The so-called factory was little more than a series of vats and retorts placed out of doors, with only a shed over them, in which not the least attempt was made to absorb or burn nauseous emanations, or to conduct a chemical process with some regard to public comfort. This was not because the evil did not permit of remedy, or, at least, of abatement, to a large *degree,* but because the parties did not know of the best methods, *or did* not care to incur the additional expense. The Local

Government Board of England has recently, through Dr. Ballard, made a most able and elaborate report as to the best method of conducting those manufacturing or chemical processes, which are apt to cause nuisance. It has been shown that these trade-occupations now admit of clear and safe conduct, and that evils arise chiefly from defects of apparatus or supervision. Already our chief routes to New York City are tainted with questionable smells, and the refuse factories which are driven from the cities of other States, find refuge within our limits. We must insist upon it, either that such establishments are not placed in our midst, or that they be conducted according to the methods consistent with our proper comfort and health.

IV. The vapor and odors from this factory illustrate how, notwithstanding the true doctrine of the diffusion of gases and the power of the air as an oxidizer or deodorent, there yet may be circumstances in which mists, vapors or organic particles may be carried unchanged for long distances and be capable of exercising their own peculiar influences. It is known that the odorous particles from this factory were at times recognizable several miles distant. After having heard statements as to its recognition at Cranford and at the docks at Perth Amboy, we had a still more convincing experience. Three weeks after my own visit to the works, on a day when the wind was east, with the damp, sleety atmosphere of an approaching snow-storm, I perceived the odor distinctly on an inland road between two woods, a distance of twelve miles from the spot. On this occasion and at two subsequent times, in similar condition of wind and moisture, it was distinctly perceived by several at a distance of eleven miles, and the odors described by those who did not know from whence it came. There is accumulating evidence that in certain conditions of atmosphere waves of vapor may move in invisible strata for distances much greater than once conceived. It is not improbable that when a contagion has become greatly multiplied in one spot, it may thus be raised and float away from its own district, and carry its infective particles long distances and affect only those that come within its zone.

SMALL-POX IN CAMDEN.

About the middle of July information reached us through private sources that there were some cases of small-pox in Camden. An official inquiry, addressed to us by the National Board of Health, with information received by them, led me, on July 28th, to address to the Sanitary Committee of that city, a letter as to facts known to the Board, as to the need of more active measures in reference to this disease, and of more active exercise of sanitary police in general. The letter was kindly received by the Common Council, and referred to its Sanitary Committee. Other communications from private citizens, induced me soon after, to visit in person the City Clerk, of Camden, as the city official with whom the Board has official relations. We obtained from him such facts as made us urge upon him at once to communicate with the sanitary authorities, some of whom were absent from the city. August 16th, I received a communication from James H. Wroth, City Physician, asking me, on behalf of the State Board of Health, to meet the Sanitary Committee at my earliest convenience. I telegraphed for a meeting the next day.

It proved to be a conference with the Sanitary Committee of the Council, and with several of the leading physicians and citizens. We spent the afternoon in a thorough inquiry into the facts as to the spread of the disease, and its localities. It was admitted to be on the increase each day, and also that adequate means had not been devised for its check. Without undue criticism of the fact, it was the accepted view that all should, with rapid promptness, co-operate in the adoption of those means which were advised. August 22d, our Board received the gratifying evidence that very active measures had been already taken, that new supplies of vaccine virus had been secured, that a system of isolation and vaccination was being followed with satisfactory results. Reports to the Board showed thirty-eight cases in the hospital, sixty cases in the city, and many persons exposed. The conference was otherwise valuable as directing attention to various other defects in sanitary administration, and in securing the initiation by the sanitary committee and others of a plan for more effective sanitary care.

Small-pox is so far a preventable disease that we need not

here report the thousand statements and arguments already in print as to the means of isolation of every occurrent case, and of such vaccination as will deprive the disease of material for attack. Clearing up the rear yard and using disinfectents is very good as a general cleanliness and is primary in case of some epidemics, but isolate and vaccinate are the primary things to do in impending small-pox. By our present methods about every seven years we raise a population so unprotected through neglect of vaccination as to give sure and hardy soil for fertilizing and propagating this disease. So long as we pursue this plan, we shall continue to have, every ten years, pecuniary losses (not to speak of lives) from small-pox, more than equivalent to what it would cost to vaccinate gratis the entire growing population.

Now that bovine virus is so easily procured and those who fear contamination from other people's children may be vaccinated from safe sources, there can be no possible excuse for an epidemic of small-pox. It is a reproach to our civilization, an evidence of a corrupted taste for eruptions and disfigurements, an ensign of carelessness, or a proof of original sin too actual for argument.

While other methods than those of compulsory vaccination may be expedient, yet our laws should go far enough to restrain those who by their neglect endanger society, from attendance on public schools, from leaving houses that are infected, or from exposures of the life and health of others until such time as vaccination has been performed or the danger has ceased.

KEROSENE EXPLOSIVES.

In the second report of this Board, pages 16–22, attention was drawn to the dangers to life resulting from illuminating oils. In view of the facts in evidence, it was claimed that some legislation is needed on the subject.

Last winter a bill was presented, which, while it sought to secure regulation, was not, in all its parts, such as the Board could have approved. The need of exact legal enactment as to the subject, is being made more and more apparent by the frequency of accidents. These oils are more largely used each year, as we find by the statements of dealers in cities where gas

can be had. Their use necessarily falls under the charge of those who are not always intelligent or careful. Some of the accidents occur in the designed use of the oils. Others result from attempts to fill burning lamps or to light fires. While this use is to be censured, yet many of the accidents that occur in such cases would not take place were the oil of standard purity. During the last year we have heard of an unusual number of these accidents, and have reason to believe that the sale of low grade oils is increasing. It is to be remembered that such oils, especially in summer, give off gases which mixed with common air are highly inflammable. Many a half full can or lamp or a partly filled barrel has this volatile and inflammable gaseous mixture floating above the surface. It is not merely formed by the light approaching, but is there ready to explode if the light or fire happens to be brought in contact.

The following case which has come under our examination this year, will illustrate:

A girl of twelve years, living in the township of Raritan, toward Perth Amboy, was left with a sick friend alone in the house, on a very warm May day. The fire was probably supposed to be out, but a few embers must have been beneath the wood she attempted to light. The can exploded and set her clothing on fire. The top was on, showing that she had only attempted to pour from the very small spout. She ran out of doors in a strong wind, and in five minutes fell on the grass, and was dead before the farmer in the field could reach her.

On visiting the house, we found that the top of the can had been so violently separated as to leave the full mark of its rim on the ceiling, and so as to cut through deep into the brown plaster. Many spots of oil had been thrown here and there over the entire kitchen. A small amount of gunpowder could not have shown greater explosive power. On inquiry we found that the quart can had in it scarcely enough oil to fill a lamp—was in a warm closet, about fifteen feet from the stove. It was evident that the can always contained the explosive gases ready to set on fire the oil or anything that came within reach. Tracing the oil to the vendor we found it had been bought and sold by him as one hundred and twelve degrees test oil and was very largely in the market in most of the towns. It was tested May 17th by Prof. A. B. Cornwall, of Princeton, and he wrote as follows:

"The sample of kerosene you left me I have tested to-day. It ashes at eighty-eight degrees Fahrenheit, and burns (fire test) ; one hundred and seven degrees Fahrenheit. The tests were iade in a Tagliabue's open tester, with a thermometer by Tagabue, specially made for such tests, and showing single degrees. . preliminary test was first made and the oil was again tested, uising the temperature uniformly from seventy-three degrees to ghty-eight degrees in twenty-four minutes, and from eightyght degrees to one hundred and seven degrees in eighteen iinutes more. The oil is unsafe."

On writing to the wholesale dealer in Newark, we received ie following:

NEWARK, N. J., May 19th, 1880.

fr. E. M. Hunt, Metuchen:

DEAR SIR:—Yours of the 18th received. We were not aware iat we were putting out oil at less test than branded. The oil shipped for us from Philadelphia, and guaranteed to us to and a test of one hundred and twelve degrees, and we guarntee to our customers this test. You will find on one of the eads of the barrel the State of Pennsylvania Inspector's brand, viz:

Inspected by Charles F. Miller. Guaranteed fire-test one hunred and twelve degrees, Philadelphia; and we supposed that ie State Inspector's brand was a sufficient guarantee that the oil ould stand test as branded. In regard to the accident you eak of, if one hundred and fifty degrees test-oil was poured ito a *burning fire*, it would ignite and explode just the same as ie one hundred and twelve degrees, and all the accidents, or inety-nine per cent. of them, happen from the careless use of erosene in just this manner, by pouring on the oil *after* the fire as been started; but we will give this our immediate attention id thoroughly investigate it, and call upon you at your office in few days. Until then, we remain

Yours, &c.

On receipt of this, we again communicated with Prof. Cornall, who not only re-affirmed his former examination, but aimed that 150° test oil poured on a fire, would not give such esults as we had found in the case. Further correspondence d not only to a visit from this firm, but from the firm in Philaelphia, which had sold the article. None of these gentlemen ere personally intending to sell below the standard. The one om Philadelphia frankly told me that such oil should never be ut on the market, especially in summer. He even cautioned

the storekeeper against allowing it to be in the barrel on front platform in the sun. He said that the article was larg sold at wholesale at about seven and a half cents per gallon, that it was so nearly a bye-product, that it would not pay to ac terate it with naptha. In half full barrels, or cans, or lamp hot days, an inflammable vapor could generally be found fl ing on the surface. One of the firm selling it here, after h ing what was said, filled his can with a different article. E of these large dealers said that the better class of whole dealers would support a proper law, although aware that t was concerted action against legislation on the part of s prominent firms.

Our experience in this case, the information given, and o inquiries, have made us feel that it is well nigh inexcusable for State longer to delay such restrictive and regulative legislat as the exigences of the public safety demand. Local He Boards in various localities are inquisitive as to their powe reference to it. The Secretary of the Board of Health, of W ington, Warren county, instituted careful tests of the oils for in that town. The fifteen oils examined were none of t found even up to the "fire test," at which they were bought sold; some of them being more dangerous than others. O the worst was one sold as 150° fire test. The examina made by Dr. Baird, and the conservative efforts made at co tion, as detailed in the *Washington Review*, of July 2d, 188(well worthy of general attention. We only ask that the re ed admonitions given by accidents, which endanger destroy life, and by the united testimony of chemists and experts, be no longer allowed to pass unheeded.

LOCAL BOARDS OF HEALTH.

The most important sanitary progress of the past year in State, has been the formation of about two hundred townsh city Boards of Health. In many of our townships are vil like Somerville, Bound Brook, etc., which stood in great ne Health Boards. Indeed, to make the Health Boards of l cities effective, there must also be some power of health ad istrated in the adjacent townships. Many of our cities found to have only sanitary committees and no adequate

ion for the mode of organizing Health Boards prescribed in ›ir charters. Many of these, like Camden and New Brunswick, ve availed themselves of the new law to organize more ›ctive boards. The Boards organized through the State have ›wn four types, decided by the intelligence or executive capa-y of those who constituted them, or by the conceptions of luential men as to what needed really to be done.

One and the smaller class has organized merely because the v requires it, and assumes that their township is perfectly althy, and really needs no Board.

A second class, while not knowing of any evils, recognized ıt it is quite possible that such may exist, and so begins in a oper way to inquire into and study the needs of the district, holds itself in readiness to consider questions or complaints ıich may arise.

A third class, knowing something of the real needs, have, in a siness, systematic way, proceeded with judicious regard to .blic rights, which circumstances justify. It is surprising ›w much some such have accomplished without recourse to vere measures, and how much the public sentiment has been ucated.

A fourth class would attack every public and private measure ith a zeal neither according to knowledge or according to the w, and are distressed that the law does not give arbitrary ›wer.

It was to be expected that in the start of such Boards there ould be incomplete knowledge as to needs, and crude views as methods; but a review of the whole evidence will show that a whole these local authorities are doing, or preparing to do, fective work.

A township which at the first wrote that they needed not to ganize, was among the very first to find itself invaded by a ıisance from an adjacent city so pronounced as to call for ;tivity.

We have numerous correspondence which shows how the ıterest of the people has been aroused, how evils are being amined, and how much room there is to believe that the law ill be salutary, as much by the information it will spread and y the evils it will prevent, as by its exercise in those cases here positive orders or legal action are required.

In many districts the first step is to secure a thorou acquaintance with the character of soil and underlying str tures, with water courses natural and artificial, with obstr tions to natural change or artificial aid—with the contour topography of the district as secured by sanitary map—w well and water supply—with cellars, house drains, cesspo privy vaults, both as to their kind and proximity, and w prevailing sickness and its localities.

A brief paper in this report by the President of one of th Boards will present some outline of the feasible work to done by such Boards. Abstracts from some of the rep received and references to their organization will give good idea of the local interest which is being manifested. have abundant evidence from various portions of the St of important preparatory work in the interest of public hea

This Board has been more frequently consulted the last y than in all previous years of its existence. While only seek to be advisory, it has a sphere of usefulness constantly enlarg and by counsel and advice has been able to give direction to portant sanitary movements.

THE NEW JERSEY SANITARY ASSOCIATION AND LOCAL ASSO TIONS.

The New Jersey Sanitary Association has proved itself a v able auxiliary to the work of this Board, and aided in awal ing public attention to sanitary matters. Its recent meet held in the city of Elizabeth, excited much attention and papers read were of great importance. The press throughout State has largely disseminated the information furnished.

The West Ewing Local Association is formed on the New plan and conducts sanitary inspections of the entire towns It has recently published a volume of its proceedings, and ı well be consulted as a model of what a rural community ı do in appreciation both of public health and local thrift.

The Sanitary Association of Elizabeth has been active useful, and succeeded in awakening local attention to he matters. In several other localities we have been made av of local voluntary organizations which are aiding in giv shape to health administration.

SANITARY MAPS AND THE HUDSON COUNTY SURVEY.

In our last report we noted the fact that arrangements had been made for a sanitary survey of those parts of Hudson county which bore relation to New York bay and harbor. This included the cities of Bayonne, Jersey City and Hoboken, and the thickly settled portions of the county adjacent. The survey was undertaken with the aid and direction of the National Board of Health. We were able to command the services of excellent engineers, and the assistance of others who had to do especially with sanitary inspection and vital statistics. The sanitary map of Speilmann & Brush, of Hoboken and Jersey City, and that of Messrs. Eddy & Carrigan, of Bayonne, are specimens of correctness and execution to which we would invite the attention of all cities. Since then, under the auspices of our Board and of the Elizabeth Sanitary Association, Ernest L. Myer, of Elizabeth, has executed a similar map with full details. We can point with pride to these three maps, as furnishing a model for the whole State, and as showing what is needed to be done in every incorporated city, town or borough. By such maps all levels can be kwnon, all underground constructions be recorded and such details, represented in a condensed or graphic way, as are essential to all future planning. For the want of just such records and outlines we have seen a local institution waste no small amount of money, and can point to cities constantly making blunders because of the absence of the necessary facts as to former work done, as to soil, gradients, etc.

In addition to the mapping, inquiries were made as to all points relating to sanitary management and specimen sanitary inspections made. It had been expected that by this time the National Board would have been able to publish the map and details, from which we could procure lithographs. It is still believed that work of such importance to the Nation, as well as to the State, will be provided for, so that the general government will place within our reach the full results. Our Board has therefore postponed the printing of the maps for this year, although they will be accessible to any cities wishing to study the plans. We publish, however, some of the details of inspection in this report, such as will give some idea of the work done and of its importance as a model.

We are also able to present in connection herewith a brief and able report on the Question of Quarantine and exterior Sanitary Defences of the New Jersey front of the Harbor of New York, kindly prepared by Dr. Elisha Harris, Secretary of the New York State Board of Health.

It is plain that there are some interests along our State front, opposite to New York City, which local care is not able to reach, and that the State in defense of its public health needs somehow to secure, better sanitary arrangements than at present exist. The crippled state of local resources delays action which ought to be taken for the protection of the people from some most flagrant and apparent sources of disease.

CONDITION OF ALMS-HOUSES—JAILS.

The State Sanitary Commission of 1866, as appointed by the law of the previous Legislature, reported as to the condition of the county and township alms-houses of the State. Some facts were then elicited which showed that their sanitary condition was too often overlooked. Some statements made as to the condition of county jails seemed to the Board to make it important to associate these in an inquiry. The Board was not able to undertake an investigation throughout the State, but thought it best to single out four or five counties as a fair indication of what might be needed in others. This work has been carefully and accurately performed and the results will appear in the paper on the subject which is a part of the report. No one can examine into the general facts as to the neglects which are apt to occur in all public institutions, where the dependent or the criminal classes are kept, without seeing that each State or each county has some provisions by which such places shall be subject to a careful examination as to their sanitary condition and the means of promoting the best interests of society, as related to the inmates. In many States this is regarded as so important as to be committed to a Board of Charities. Our inquiry has only related to those matters which bear more directly on health conditions. It is evident that in this respect there is need of more careful circumspection. Either the State Board or Local Boards of Health should so acquaint themselves with the sanitary condition of these institutions as to secure them from being sources of evil either to the surrounding or to the inmates. Just

ıs the report is being printed, we have had occasion to make a anitary investigation of the Camden County Alms-house, on ıccount of a malignant form of fever prevailing there. The letails will appear in the next report; but the number of nmates and the idleness and overcrowding that occurs in the vinter months, is even to the casual observer, evidence that a itricter care of all our county and township alms-houses is ıeeded. The present deplorable condition of that institution, is ›nly what must occur whenever the spark alights to set ablaze :he extra-hazardous material which has been collected.

DRAINAGE.

In dealing with great sanitary questions we are constantly feeling how essential are proper ground conditions to the maintenance of health.

Natural water-courses are impeded and no provision made for that additional drainage which varied construction and alteration demand. This is especially true in respect to cities. Among the valuable papers of this report will be found one which presents this subject with fullness of detail, and with direct evidence as to its bearings upon the life and health of our population. We call special attention to the careful use made of some of the English tables, and to the practical methods advised for executing such sanitary work.

WATER SUPPLY.

The oft-recurring and vital question of water supply is occupying the attention of many portions of our State. Several of our larger cities have no adequate water supply. Others, while having sufficient quantity, have reasons for great misgiving as to quality. While in good seasons and for the present there may be escape from very pronounced evils, a great risk is being run. There are reductions of vital force and bowel disturbances from impure water, which shorten and destroy as many lives as does an occasional epidemic. Most of our larger cities are on tide water, and so, near the emptying places of rivers. It matters much whether a water-course is intercepted and in part appropriated as a water supply away up near its

sources, or whether it is taken as near its exit, as Newark or Jersey City. In many of our towns reliance is still placed upon well water. This answers, in the smaller villages, before any one street becomes compact; but where houses crowd each other, and the various out-door and in-door contrivances and cesspools of cities are introduced, there is no defense for the well. Its good previous reputation cannot save it when it gets into such vile company. It was for a time thought that driven wells, or wells called artesian, which go down beyond the reach of soil contamination, would be our safety. But joints or fissures in much of the underlying rock may contaminate these. Worse than all, by reason of hardness or other saline constituents, the water is seldom fit for use. The many trials about Newark and Bellville and Orange have, for the most part, proved unsatisfactory, except as furnishing a supply for machinery use. Rain water, properly stored in cisterns, often answers well, and is not liable to some of the objections urged against the rain water of the British Isles. Dr. Fox, an able medical officer of health, in his work on the "Sanitary Examinations of Water, Air and Food," places last the "waters of streams and rivulets, the majority of which contain more or less filth, and in times of heavy rains, soil and mineral debris of every description." All these water questions are worthy of the closest expert study before expensive methods of supply are adopted; but they should not be left undecided so long as to peril the growth of our cities and the health of the inhabitants. We hope ere long more fully to draw attention to the water-sheds of our State, and to the indications for supply which relate to special localities.

OUR SEASIDE RESORTS.

These need our careful attention because of their rapid growth; because so many of our citizens spend a portion of their time as residents there, and because so many take it for granted that a sandy soil will purify all that enters it and the great sea quickly carry away all that flows into its waters.

It is, however, constantly to be borne in mind that pure sand is not a good filter. We know of a case in which, on our shore, a part of a barrel of brine was emptied more than fifty feet distant from a deep tube or driven well. About three weeks

afterwards the water of the well was found to be salt, and so continued for several days. The circumstance was recalled, and there was good reason to believe that the salt had thus found its way into the deep water supply.

It is known that at many places cesspools are relied upon and found convenient because they so seldom fill. Their contents pass rapidly into the soil and may easily pollute it or render it unfit for a water supply. In these rapidly growing towns and villages it should be an axiom that cesspools, if used at all, should be made so tight that their contents will not leak into the ground, and should be emptied on a system. Since the introduction of iron piers, it may be quite feasible to have sewage boats so built that they shall receive this sewage by means of pipes and as often as necessary, carry it out from shore, beyond the possibility of deposit on the shore sand. To illustrate the crudeness of present methods of sea-side disposal, and the necessity of a more defensible system, we need only quote from the recent work of Robinson, an English Authority on Sewage Disposal:

"To avoid a nuisance the sewage must be discharged into the sea at a point, not only below low water, but where there is a well ascertained current which would carry it permanently seaward.

A point of discharge complying with these conditions cannot always be found to exist close to the town, or requires to be ascertained by careful tidal and other observations. At the outfall there should be a continuous movement seaward during the twenty-four hours, instead of an oscillating action to and fro, resulting in a return of the sewage and its disposition along the shore, not only at the outfall and in its immediate neighborhood, but also at distant places to which the tide carries. The foreshore of many watering places is being polluted in this way, and in time it will prejudicially affect them, as the knowledge that the foreshore is polluted becomes generally known.

The expenditure necessary to ensure an efficient system of sewage disposal, although it may appear heavy at first, is in the end, the truest economy.

The difficulties attending the discharge of sewage into the sea would be diminished were it not that it has a higher tempera-

ture, and a lower specific gravity than sea or river water, which causes it to rise to the surface. If it is not carried seaward quickly, part of the suspended solid impurities are deposited on the coast wherever there is still water and no tidal current, whilst the rest of the suspended, together with the dissolved impurities float on the surface, and are carried backwards and forwards by every tide, decomposing and liberating offensive gases."

This action was pointed out by Professor Stanley Jevons, in a letter to the *Times*, of December 2d, 1878, with reference to the formation of sewage mud banks in the Thames, by the discharge of sewage at the outfalls at Crossness and Barking.

He pointed out that matters which would remain suspended for many days in fresh water, would be readily precipitated in a few hours when the water is saline, and states that much of the sewage matter indeed, would, if left to itself, float in water; but in the presence of saline matter, which kills the pedetic or oscillating motion of suspended particles, cohesive attraction comes into play. The minute particles of suspended clay will then adhere to the organic sewage particles, and carry them to the bottom of the river, where they will form foul pestiferous banks of ooze.

In the same way we may explain the peculiarly unhealthy effect produced at seaside watering places, where the sewage is poured down the beach, into the sea, in front of the town, if any such there still be. Unless there be strong tidal currents the foul particles are not carried away, but are precipitated and mingled with the sand and mud of the beach.

If the salt water enters the sewers the deposit will occur therein, and we may infer that flushing the sewers with sea water, will probably do a good deal more harm than good.

In the proceedings of the Boston Society of Natural History, for February, 1874, Dr. Hunt, states: I have called attention to the fact that the clay resulting from the decay of rock remains for many days suspended in pure water, though not in waters even slightly saline, and is therefore readily precipitated in a few hours, when the turbid fresh waters mingle with those of the sea, thus forming fine argillaceous sediments.

The geological significance of this fact was, it is believed, first

pointed out in 1861, by Mr. Lidell, in Humphrey's and Abbot's "Report on the Physics and Hydraulics of the Mississippi River," (appendix A, p. xi,) where he applied it to explain the accumulations of mud at this river's mouth.

Sea water delays the oxidation of organic matters, so that the foul constituents of sewage, which in river water would be liberated and got rid of in a short time, are preserved in sea water, which causes them to accumulate and form dangerous deposits ready for the quickening action of the summer sun, when gases, injurious to health, are evolved. It is claimed, too, that brackish water, or foul material slightly saltish, attacks the refuse matters, and liberates foul-smelling gases.

The objectionable nature of deposits from sewage is evidenced by the observations made by the late Dr. Letheby, on the mud banks that are forming in the river Thames. He describes them as being composed of black and fetid mud, in a state of active putrefactive decomposition, and when examined under the microscope, they were found to consist of broken-up sewage matter, the remains of animalcules, the disintegrated tissues of vegetables, and swarms of diatomaceous remains; and he stated that the mud and suspended matters of the river contained from 6.3 to 18.9 per cent. of the solid constituents of sewage.

To prevent the possibility of doubt the connection between the deposits in the river, and the sewage discharge from the outfalls, has been clearly traced by analyses, and the chemical correspondence between the two unmistakably established.

The same opinion is held by Dr. Frankland and Dr. Tidy as to the similarity in chemical composition between the mud banks in the Thames and the sewage of the outfalls. In some cases, by means of long outfall sewers, the sewage is carried away from the place producing it to the sea, but they are frequently simply transferring the refuse to others, a set of the tide carrying it so as to cause mischief and nuisance elsewhere.

These outfall sewers require careful ventilation as the sewer gases are otherwise liable to be forced back into the town drains at high tide, or after storms, and thus into the houses, even if the house drains are trapped from the main sewers.

A catchment pit should be placed at the outfall, and the solids deposited therein removed systematically. Even then the addi-

tion of a disinfectant and deodorant is sometimes desirable, or it may be found feasible in connection with our iron piers to have a sewage boat so constructed as daily to receive the sewage and convey it three or four miles out to sea.

It will be pleasant when our own seaside resorts attain the precision in health management now secured by most of the English watering places. It is now considered indispensible that these should be able to certify themselves to the public, as to their water supply and methods of sewage disposal, and as to the actual records of health, both of residents and non-residents for series of years. Douglas Galton, in his anniversary address before the Sanitary Institute of Great Britain, says: "A comparison of the local acts obtained by different towns, shows the progress which is continually taking place in the sanitary intelligence of the community. This is illustrated by taking only one point, viz: the registrars of disease in several towns, notably, watering places or health resorts in which self-interest is largely concerned, have obtained power in special acts of Parliament to require the compulsory registration of infectious diseases. These towns, instead of concealing real nuisances or causes of disease, found that it is better, by publicity, to subject themselves to the highest tests of salubrity, and at the same time avail themselves of the highest motives for sanitary completeness.

RESCUE OF THE DROWNING.

The fact that our vital statistics of the last year showed the loss of one hundred and ninety-three persons by drowning, and that we have so long an extent of sea-coast, led us to print in the report of last year an article on drowning. Afterward the whole subject of the rescue from asphyxia was re-studied, and a full examination made of all the plans adopted for the resuscitation of the drowned. The result was the circular issued by this Board and largely distributed throughout the State. A captain in the life-saving service on our coast made himself conversant with it, and soon had an opportunity to apply it, as thus stated: "In a case of drowning at Monmouth Beach, not long since, after various efforts had been used to resuscitate the body by those present, Captain C. H. Valentine, Superintendent of

Life Saving Station No. 4, was sent for, and restored the man by following the rules for resuscitating the drowned, as laid down by the State Board of Health, and known as the New Jersey Method. These regulations have been adopted throughout the State, and are the most serviceable of any of the methods for resuscitating the drowned." It contains two or three directions not to be found in any other plan, and insists upon the value of the electric battery and the hypodermic syringe for administering brandy and digitalis. We commend it to the careful study of all who may be called on to treat such cases. We believe all life stations and all prominent hotels should have ready at hand the pocket battery and the hypodermic syringe. The whole cost is not over ten dollars, and, in some cases, these are indispensable. No one could read the facts as to the recent loss of General Torbet without feeling that any such resuscitation at hand would have saved his life. We commend this whole subject to the attention of our citizens, not only because of the number of accidents the last summer, but because, with our rivers and lakes and great seaside resorts, there is likely to be frequent need of this kind of service. Medical aid is in vain in such cases unless there is a full knowledge of the best methods of manipulation, and a ready resort to these collateral aids when required. We believe that this circular should be in each hotel on our coast, and that local health boards should extend a knowledge of it.

REGULATION OF MEDICAL PRACTICE.

In the early history of our country, and especially in our own State, important safeguards existed in order to assure the people that those who attempted the practice either of medicine, surgery or midwifery, had received such special preparation for their work, as to assure the people that the interests of human life would be promoted by their art.

By degrees, legislative restrictions gave way to an almost unprotected laxity. Illinois was the first State to move in the direction of restoring restrictive legislation. This did not seek to discriminate in favor of any one school or sect, but only required that all who professed to exercise the healing art should be able to give such evidence of previous preparation for their

duties, as might not unduly risk the health and the life of the citizen. The law went into effect July, 1877. It was found that out of the 7,600 physicians in the State, only 3,600 were legalized practitioners. In 1880 the number of authorized practitioners had increased to 4,825, and the number of unqualified practitioners had greatly decreased. Last year an additional evil was discovered, in the sale of diplomas, and became so flagrant as to attract the attention of our National Government. Subsequent revelations leave no doubt that in addition to the multitudes of unqualified practitioners who could show no license, several thousands more have operated under bogus diplomas and still further jeopardized human life. The disposition to limitation and restriction in our State, was manifest among the people and in some of our intelligent legislators before it was among authorized medical practitioners. The latter had become so used to this kind of laxity and so displeased with successive acts of legislation which had practically deprived them of any control of the matter, that they apparently viewed it with little concern. But it became so evident that the public health was suffering from this promiscuous practice, that the last Legislature enacted a mild form of restricting law. It only seeks to assure that each person claiming to be a doctor of medicine, should have received a license from some duly authorized Medical College. The State having done this much to protect the public health, and having shown this appreciation of the relation of proper medical education to the welfare of the citizen, it behooves all regularly educated practitioners to do their part in aiding to secure the fulfillment of the law. We think that the responsibility of a carrying out and enforcement of the law, commends itself to all local medical societies of all sects. No man whose diploma will not bear scrutiny need now be allowed to practice upon the credulity of the citizens. By a record of places of graduation, the people are better able to discriminate between those colleges of any sect which are best and those which have too low a grade of requirement. This Board has felt called upon to recognize this as one of the points in which the public has been guarded against what had become a prevailing nuisance. We append to this report a copy of the circular issued in reference to it and

:lusive of the law. We counsel both the people and all local
›dical societies to see to it that its requirements are complied
th. We hope to have ere long a completed list of all those
.ose names are recorded as practitioners, as we have now of all
›se who claim to be practitioners, in each locality and so shall
able to compare the two. The duties of this Board are now
numerous that we can scarcely do more than register the
mes. It must be left mostly to the people of each vicinity
d to authorized medical practitioners to see that purchased
›lomas and empirics are abated. The law much needs a
use by which the genuineness of copies of diplomas offered
record can be known.

THE SANITARY EXHIBIT.

The value of an exhibition of sanitary appliances, as a means
acquainting the people with the principles of their applica-
n, and with various improvements conservative of the public
ılth has long been recognized in Great Britain. Under the
spices of the New Jersey State Fair, and with the aid of this
ard, the first American exhibit was held last year at Waverly.
is year the Agricultural Society erected a special building for
› sanitary department. Although the display was not exten-
e, we think no one examined it without feeling fully repaid,
d without realizing its importance. Systems of heating and
ıtilation, the disposal of sewage, the various forms of house-
ld contrivances and other sanitary subjects were illustrated.
› invite to it the attention of all citizens, and hope as a Board
join with others in promoting so great an interest. It will be
r plan to have on hand for exhibit some of the latest improve-
nts from the sanitary museum we are seeking to establish at
›nton, and also each year to secure from dealers and inventors
›ir most approved appliances.

METEOROLOGY AND CLIMATOLOGY.

'Meteorology properly embraces the study of atmospheric phe-
mena resulting in connection with the physical properties
d conformation of the earth, in what we call climate and
ather." We, therefore, in its bearing on public health, study

meteorology only in its bearing in climatology. It is important to make precise records of atmospheric and atomic conditions as expressed in air, earth and water, in darkness and sunshine, in rain and snow, in frost and ice, in wind and moisture.

Having in these the elements from which weather is formed, we have the important factors which make up the climatic conditions, and so constitute the *climate*. Alongside of this, day by day, and month by month, we put the records of disease, of epidemics, of death.

It is evident that this is a department of health-study very discouraging to those who would arrive at quick conclusions. The long work of science is to collect every fact and through a sufficient number of years, so as to make the study feasible. It is encouraging that such results have been secured as enable us to predict many weather changes. Yet we still feel "that the time for the deductive treatment of weather problems has not yet arrived." The relations of weather and disease are still more complex and introduce a study as difficult as it is important. Outlines are already studied with advantage, but close deduction is still much in the future. Our Board at present only seeks to put accurately on record the chief facts as to weather conditions, in order that these comparisons may be made whenever sufficient facts are secured.

We, this year, are favored with the record of Hon. Wm. Whitehead since 1838, and thus supplement the record made by him at the time of the publication of the Geology of New Jersey in 1868. We are also perfecting records at Princeton, Newton and Vineland. New York and Philadelphia will represent other points in our State, and the records of the Signal Service are also of value. We hope thus to put on record several facts as to the weather, which will furnish the data for comparisons with prevalent diseases. The climate of the State is well worthy of the closest study in its bearing on health and disease. It has far more than usual varieties. Within our own borders, we believe, will yet be found nooks and districts which will show a record equal to the purity of the Adirondacks, and to the equability of Aiken. It may yet be that the consumptive will, on the basis of weather records, be able to stop short of Florida, and the seeker of a summer resort, not only on our ocean front, but amid our pines or high up in the northern hills, be able to show both

by records of instruments of physicians and by the experience of invalids, a climate as desirable as any to be found in the States. Some special weather conditions of the year are noted elsewhere.

It is constantly apparent that diseases are greatly affected by what we term the climate and the weather. "They are concerned, says Russell, in seasonal variations, in the prevalence of disease; in regional variations of disease; in the circumstances which at one time and in one place give wings, so to speak, to the contagion, and at other places and at other times obstruct their progress. We must recognize these facts if we wish to avoid the risk of falling into erroneous assertion of success for preventive measures, and also to justify at times what might seem undue confidence or undue anxiety as to the probable course of some disease where contagia is dominated in its activities by those cosmical conditions." * * * The seasons bring their special tendencies to disease. Temperature, and rain fall and hydrometric and electric phenomena are attended by proclivities to some diseases, while they are hostile to others. Were these the only controlling agencies, as we can not control the weather, we would only study how to modify its effects or protect ourselves therefrom. But as these climatic conditions only act upon materials already in existence so far as contagions are concerned, we seek to suspend or diminish these even though we can not operate with good success upon things celestial. Our inability to control these climatic conditions is no more a reason for neglecting to study the source and causes of contagion, than it would be for the farmer to neglect all the details of preparing ground and sowing and caring for the seed because he could not know all about the weather and the coming season.

DISEASES OF ANIMALS.

An inquiry into the diseases of animals has always been a part of the duties of this Board. It has close relations to the public health, because of the flesh and milk consumed, because some diseases of animals are communicated to or affect mankind, and because through their comparative study we get light upon the nature, causes and prevention of some human diseases.

By an act of the last Legislature the care of the contagious

diseases of animals was committed to this Board, with special reference to contagious pleuro-pneumonia which had existed the previous year in the State. The fact that at the close of the service of a temporary bureau of the previous year, 110 herds of cattle were in quarantine, made it necessary promptly to examine into the disease as it had existed or did still exist in these herds. A full inquiry and investigation showed that any disease that had existed in these herds had nearly ceased.

Active measures were at once taken by this Board to keep apprised of any new outbreaks in these localities or elsewhere, and circulars largely distributed to aid both in the identification and prompt report of cases. It has been a year of heavy loss of cattle by reason of fire, drought and sickness, and so, many cases came under our inspection for examination which were found suffering from other causes. The chief localities of the disease have been in one township of Union and Camden county, and in some of the townships about Mt. Holly, in Burlington county.

The disease has needed very careful guarding, and in several herds in the latter county has been difficult to control. Some animals died in each of these counties, and many more were slaughtered. It has been a large burden and anxiety to this Board, but the results have been fully as satisfactory as we could have expected. We have been greatly aided by the Pennsylvania authorities. The disease still needs watchful care. The full minutes as to it, will be found, as required by law, in the Report of the State Board of Agriculture.

The collateral interests of the disease are such in respect to public health, that an article on Pleuro-Pneumonia is embodied in this Report, together with some circulars relating thereto. The whole subject is worthy of the careful attention of all of our citizens, for the terms of the disease have not been magnified. With the single exception of a difference of opinion as to the construction of a clause of the law, which was amicably settled by reference to the Attorney-General, the co-operation given us by the farmers has been complete, and we owe much to their appreciation and aid. William E. Miller, D. V. S., of Camden, J. K. Dyer, D. V. S., of Mt. Holly, and J. A. McLaughlin, D. V. S., of Jersey City, have faithfully served the Board as Inspectors, and we are indebted to other veterinarians for information and assistance.

A few cases of glanders have occurred in the State. Of these, ne were disposed of without compensation by the consent of owner. In two instances payment was made by the Board. eumo-Enteretis, or hog *cholera*, as it is popularly, but erroously called, has prevailed in a portion of Warren county. hough a contagious and destructive disease, about which the mers need information, it does not at present threaten to ead. The excellent treatise of the National Government as to has been furnished by us in all infected localities.

Fowl-cholera, splenic fever, anthrax and tuberculosis, and the ious other comparative studies, both with reference to dises and pathological changes in flesh and secretions resulting m disease, can not be overlooked by those who are concerned ner in the art of preventing or healing disease. The recent narkable investigations of Pasteur, Touissant, Koch, Greend and Fleming, as to the causes of fowl cholera which is not holera, but a virulent blood poison, attended with swelling of cervical glands and dnodenal inflammation, has recently n discovered by Pasteur to be capable of prevention by a accine" method, and the discovery may lead to similar thod, through a large range of animal diseases.

An epizootic, similar to that which occurred in 1872–3, has vailed among horses during the fall of 1880. It had a simi- direction of movement, and similar symptoms, but was not ended with so large a mortality. The climatic conditions re more favorable than during the former epidemic. There is dence to show that at the same time a similar influenza preiled among men. In some cases it almost seemed to have en communicated from horses.

MILK SUPPLY.

A bill referring to the sale and adulteration of milk, was ite informally placed under the oversight of Board. A comtent inspector was placed in charge of its execution. He has ne all that the bill would permit, and has accomplished someing in guarding the public health. It is essential that some erations be made in it if it is to be effective for the purposes signed. The law and circulars as issued are appended to the port. The article of Dr. William K. Newton, the inspector, on lk supply contains important information, and may help to ide us to future legislation.

PAPERS, SCHEDULES AND MAPS

RELATING TO SURVEY OF PARTS OF HUDSON COUNTY.

REPORT OF SANITARY SURVEY AND INSPECTION OF PARTS OF HUDSON COUNTY, AS DIRECTED BY THE NATIONAL BOARD OF HEALTH, UNDER THE SUPERVISION OF THE NEW JERSEY STATE BOARD OF HEALTH.

BY MESSRS. SPIELMANN & BRUSH, HOBOKEN, N. J.

GENTLEMEN:—In the discharge of the duties assigned us, we have the honor to make to you the following report as embodying suggestions with reference to such questions contained under schedules "F," "H," "K," "L" and "M," as seemed to us most important and as needing your attention to be directed to them. We will confine ourselves, in our remarks, to the questions as far as they concern Hoboken, West Hoboken, Weehauken, town of Union and township of Union, the remainder of the inspection having been apportioned to the other gentlemen composing the committee. We have already in our answers, in many instances, embodied suggestions which, in themselves, virtually form the basis of a report. But in order to call more special attention to the most important items, we will take them up in regular order, and point out what, to us, has seemed the most important particulars in which the sanitary condition of these places might be improved.

In carefully reading over the questions and answers to them under schedule "F," we find our attention directed to question 14: "Are the cellars and basements in any part of the city damp or insufficiently drained? If so specify." Under schedule "F," question 17: "What proportion of the area of the city is

not sewered?" We find that about one-half of Hoboken, or about three hundred and sixty acres, is not sewered at all. Besides not being sewered, it must be borne in mind that this portion is mostly meadow or swamp land, about two feet below high tide. As a natural consequence, it is constantly saturated and covered with water, which, being mostly stagnant and poisoned by the addition of sewage matter from privies, refuse and garbage from houses and animal secretions, becomes very foul, and pollutes the atmosphere in the entire neighborhood, thus rendering it unfit to be breathed.

The extent of the prevalence of these gases during the warm season may be realized when we consider the fact that the paint on the outside of dwellings, in the worst neighborhood, has become decomposed and rendered of that bluish tinge which the interior of outhouses frequently assumes. Consequently, not only are the cellars and basements in this portion of Hoboken insufficiently drained, but practically, they are not drained at all, thus leaving the cellars always moist and most of the time partially or entirely filled with water.

The detriment to health from such a lack of drainage must be apparent to all, and by reference to a report on the death rate from zymotic diseases in this part of Hoboken, read by our firm at the last annual meeting at Trenton, it will appear to have been fully twice as great during the year 1875 as in the more elevated portions of the city where proper drainage has been provided, and more attention is paid to the laws of health.

We might add a great deal to what we have already said; in fact, it is a subject upon which a great deal of interest has been concentrated lately; but will conclude with the suggestion:

That the only remedy for this grievous evil is a thorough and complete system for the drainage of the low lands by dykes, dams, sewers and pumps and such other provision as will provide for the thorough pumping out of the sewage and rain water at all times and under all circumstances. The above subject is one which has been investigated by competent engineers in this locality, and upon which plans, accompanied by full and exhaustive reports, have been prepared and submitted to the public authorities. The question remaining unsolved in the main is the one: How shall it be brought about and who shall pay for it? This we will not discuss but will leave to the persons

directly interested. We will now turn to Schedule "H," and under it to question 21—30. "In regard to use of cesspools, privy vaults and water closets and manner of constructing them and keeping them clean?" In the city of Hoboken, where sewers exist, the water closets in use in all other cities having drainage and water supply, are employed. These, although of the most approved pattern, always become objectionable when within a building, unless they are perfectly ventilated. This it is not always an easy matter to do, and provision is only seldom made for it; consequently when they are located in the interior of a building, without communicating with the outer air directly by a window, and are not ventilated by a special flue or pipe communicating with the exterior, they often become very objectionable and may give rise to disease by poisonous gases. The outhouses and privy vaults, although emptied once in several months, yet as they are located in a closely built back yard, surrounded by high walls, are not so likely to make the air in the interior of a building impure and poisonous as an illy ventilated water closet.

We would therefore conclude that the most desirable location for a water closet is entirely without a building, especially when we can have it connected with a good sewer, thus providing for its always being clean and free from the accumulation of objectionable matter. If this cannot be secured, a proper system of ventilation should be provided in every instance in which water closets are located in the interior of buildings, and especially should this be compulsory in all schools, halls, and large public buildings, for which purpose compulsory laws should be passed. Questions 7, 8, 9, under Schedule "K," "As to slaughter houses and abattoirs" have especial interest since the large abattoir and stock yards are here and constitute the chief cattle market for a large population.

It is often the case that animals are loaded, or rather packed in close cars, so that they cannot lie down, and are required to stand without either food or water for four or five days, and are then unloaded at a place of slaughter, and killed in an hour afterwards, and while laboring under an intense degree of excitement. If the consumers of beef could witness the long trains of cars loaded with cattle while being brought from the west and required to stand on sidings, often a whole day at a time, and

hear the lowing and moaning of the poor suffering brutes for the luxuries, to them, of food and water, such a hue and cry would go up as would soon create some legislative action upon the subject. So long as that state of affairs is allowed to exist just so long must we expect to have meat wholly unfit for human consumption, go upon the market.

All diseases that are accompanied by acute febrile symptoms in the first stages, as well as those that are characterized by purulent collections which are afterwards absorbed into the circulatory system, will render the flesh unfit for human consumption, to wit: An animal being required to stand in an open car for a long time without food or drink, becomes in consequence debilitated, which renders it susceptible to contract colds, which is a common term for catarrh, whether gastric, nasal, intestinal or any other form, inflammation supervenes which often assumes a gangrenous nature; strumous diseases follow, and in consequence the system will soon become loaded with effete materials which permeate the flesh.

This condition may be present either in the first or acute or in the second or chronic stage."

Under manufactories and trades, (schedule "L,") we only need to say that there are very few manufactories in the section included in our territory, and that we took pains to visit them and inspect them carefully, with very gratifying results.

We found them in every case well provided with means for lighting and ventilating them, and the appearance of the operatives was in general very gratifying.

By reference to the answers under schedule "L," it will appear that no children of tender years are employed, but that the ages of the youngest are not generally below 13, and that the regulations governing their hours of work are reasonable. We only hope that other districts will show as favorable a result.

We now turn to the closing schedule "M," perhaps the most important. Much can be said upon the merits of the different items under the schedule, and still the fund of information could hardly be exhausted. We cannot refrain from acknowledging the uniform courtesy extended to us by all the principals visited and the spirit of interest manifested by them to co-operate with us.

By reference to question "3," under schedule "M," the plans of

schools will show that the rooms are generally of good size l well arranged. Much trouble is experienced in securing ·per ventilation. Our impression on visiting the different ools generally, was that the air was thick and impure because ıtilation in most of them could be secured only by opening windows. The teachers themselves do not seem to realize ; fact as visitors coming from out doors do, because constant l continuous confinement indoors renders them less suscep- e to notice the impurity, than those who have the advantage being in the open air much. We spoke of this to many of m, and found they concurred with us in our views and nitted the difficulty.

ꓥs a remedy we would suggest that every room in a school- ıse should have a separate ventilating flue, communicating h the outer air in order that the ventilation should become ıparatively self-adjusting. The lack in this respect may accounted for in consequence of the date of construction of ny of them, which was at a time when the subject of ventila- ı was not so well understood, and had not attracted the ›ntion of the public in the same degree that it now does.

Ve cannot close without referring to the unsatisfactory answers ꞁined to the questions and notes under No. 44 of this schedule. Iotwithstanding the fact that we visited many of the oldest ctitioners and tried to get their views on the subject matter ler this question, we found that they had not had occasion to mine into it previously, and were thus unwilling to express opinion entering into details on the subject matter.

'hysicians ought to be entrusted with this very important sion in order that when another inspection may be ordered the National Board they may be prepared to meet it.

f private corporations find it sufficiently important to warrant m in examining their servants, who are entrusted with the ɜ of life, in regard to color blindness, then how much more ›ortant should it be for the National Government to secure ilar and even more comprehensive information with refer- e to the public from the institutions of learning, by means ›xamination conducted by the medical profession.

Ve close our report with the above suggestions and hope that ir contents will awaken a still greater interest in the subject ɜanitary engineering, especially for the important section ler consideration.

REPORT OF SANITARY SURVEY AND INSPECTION OF PARTS OF HUDSON COUNTY, NEW JERSEY, AS DIRECTED BY THE NATIONAL BOARD OF HEALTH, UNDER SUPERVISION OF THE NEW JERSEY STATE BOARD OF HEALTH.

REPORT OF MESSRS. BRUSH & EDDY, OF BAYONNE, N. J.

GENTLEMEN:—In the discharge of the duties assigned us, we have the honor to make to you the following report of the sanitary survey and inspection of the city of Bayonne, New Jersey.

The city comprises the territory formerly known as that part of old Bergen township south of Morris canal. It is surrounded by water, and is bounded on the north by the Morris canal, on the east by New York Bay, on the south by the Kill von Kull, and on the west by Newark Bay; including an area of 2,560 acres; of which about 500 is salt meadow, and about 100 closely built upon. Its topography is quite similar to the neighboring metropolis—Manhattan Island.

The city was founded in 1861, and incorporated in 1869. The population in 1870 was 3,835, and the estimated population at the present time (April, 1880,) is 8,000, of these about 700 are under 5 years of age.

The site of the city is nearly level, and the original conformation has not been materially changed.

The highest elevation above sea level is 67 feet, the lowest 1 foot, and the average level of the city is 30 feet. The direction of the general surface slope of the city is southeast.

The character of the surface soil is sandy and loamy, with occasional croppings of trap rock. About 10 acres on Kill von Kull, and about 10 acres on New York Bay, is known as made land. This "made land" is not as yet built upon, but is intended for docks and warehouses.

WATER SUPPLY.—The water supply is by means of wells and cisterns.

STREETS.—The usual width of the street is sixty feet, with a sidewalk one-fifth the width of the street. The sidewalks are paved with bluestone 4 feet wide. Forty-three miles of streets are unpaved, only one mile is paved, and that with Macadam pavement.

HABITATIONS.—The dwelling houses now in the city limits number about twelve hundred; these are mostly wooden buildings, two or three stories high, and nearly all, with the exception of those located in the Fourth Ward, and at Constable Hook, and a few rows of brick and wooden buildings in the Second Ward, are detached or isolated, with sufficient clear space all around them; about one-third are inhabited by the owners, and the average occupancy of each dwelling throughout the city is seven. There are about three hundred tenement houses in the city; these are located in the Fourth Ward and at Constable Hook. The tenements, at present, if we except those at Constable Hook, are not overcrowded; but as the tendency is to erect buildings of this description in certain sections of the city, especially in the neighborhood of manufactories, (which are increasing rapidly on our water fronts,) and knowing the evils which imperil health and life, in consequence of overcrowding and bad ventilation, we think it wise, in time, that municipal regulations be enacted for the proper construction of dwellings and the prevention of overcrowding.

By reference to the survey map, we see at present constructed four and one-half miles of sewers in the city. All the dwellings along this sewer line, and where practicable a short distance off the line, have sewer connections with tight drains and traps. Most of the houses off these sewer lines, except those located near the borders or water fronts, have the laundry and waste water drainage into the gutters, and the cellars in some localities are damp, by reason of insufficient drainage.

SEWERS.—The city has adopted a complete plan for sewerage, as shown on the topographical map, but as they have no power to enter private property, and as some of the streets through which the outlet sewers would pass are not open, they have resorted to the expedient of temporary outlets across the salt meadows; notably at the foot of Cottage street, where the sewer-

age of the most densely populated section is thrown into an open ditch, which has become reeking with filth, and a source of much trouble to the Health Board. We would recommend additional powers to local boards of health, to force the completion of sewers to their proper outlet.

GARBAGE AND EXCRETA:—No contract exists in the city for the removal of garbage, and the proper distribution of ashes, garbage and rubbish is becoming one of the most difficult and troublesome duties of the local Board of Health of this city. In those sections of the city adjoining farm lands and gardens, the garbage is used for compost. By some it is thrown over fences into vacant lots, to be consumed by fowls, or left to decompose. A portion of the swill and garbage is collected from house to house by persons engaged in feeding swine, but this is done in a very careless manner, with open wagons or wheelbarrows; the liquid portions leak from the rude vehicles as they pass along the streets or sidewalks, and often a considerable part is deposited on the walks or in the gutters. On the sidewalk before some of the tenement houses, the owners have placed large wooden boxes, into which is deposited all the ashes, garbage and filth accruing on the premises, but in consequence of the very irregular and imperfect manner in which they are emptied, they become worse than useless; they are allowed often to become full to overflowing, and left in this condition for days, exposed to the influence of sun and rain, their contents becoming fluid from putrefaction, leak through upon the sidewalks and into the gutters. These wooden structures are liable to become so saturated with the fluids escaping from their filthy contents, as to constitute, of themselves, a disgusting nuisance, detrimental to health. These facts suggest the necessity of adopting some temporary receptacle for garbage, constructed of a material that will not absorb fluids, and for a *regular* and *systematic* method of collecting and disposing of such house refuse; perhaps a box of proper shape and size, made of wood that has been thoroughly kyanized or saturated with carbolic acid, might be kept sufficiently disinfected to be harmless.

PRIVY VAULTS AND WELLS.—About three-fourths of the dwellings depend wholly on privy vaults, and a very few, if any, of these vaults are water tight, and no regulations exist, as to the method of construction or cleaning the same. The faulty con-

struction and bad management of these vaults will become one of the chief causes of disease in the crowded districts. Some of these vaults are in too close proximity to wells, and the waters are very liable to be contaminated by the infiltration, through the ground, of liquid material from the vaults into the wells. We would suggest the great importance of having all privy vaults water-tight, and, when possible, connected with the sewer. The vaults should be constructed in such a manner, by rear folding doors, sheds, &c., that they may be readily cleaned out. We would also suggest the importance, especially in the tenement portions of the district, of prohibiting the sinking of wells on the premises, and that at proper intervals or distances on the sidewalk wells be sunk, from which water may be drawn, for drinking and culinary purposes, by means of the "old tea water pump."

GAS.—The gas works, and the quality of gas furnished, are satisfactory on all points.

MARKETS AND SLAUGHTER HOUSES.—There are no public markets or slaughter houses in the city limits. The tradesmen, and many of the inhabitants, obtain their supply of meats and vegetables mostly from New York City.

MILK SUPPLY.—The quality of the milk supplied is very good.

PUBLIC SCHOOL BUILDINGS.—There are five (5) substantial brick public school buildings in the city. They are all detached, with plenty of ground and air space around, and will compare favorably, as regards location, construction, grade and course of studies, with any in the State. We append to the report the floor plan of each school, and copies of the Manual of the Board of Education.

MANUFACTORIES AND TRADES.—The manufacturing establishments in the city at present are mostly located at Constable Hook, on Kill von Kull, viz: Raynold's Color Works; Osgood & Co.'s Zinc and Acid Works; White's Sulphur Works; Standard Oil Company Refinery; Sea Board Refinery, and Kalbfleisch's Sons Chemical Works.

As the tendency is to an increase of manufactories of various kinds on the water fronts, proper restrictions should be imposed, to prevent the escape of noxious gases or vapors into the external air; for no business, detrimental to the public health, that posi-

tively neglects to adopt the well-known remedies that will perfectly remove all cause of complaint, should be tolerated in a civilized community.

FILLING IN OF WATER FRONTS.—As the filling of the shallow waters of the adjacent bays is becoming an enterprise of the immediate future, we would call attention to the practice of filling with New York City garbage. The area to be filled is extensive, and its value, when improved, offers great inducements to effect its improvement. The use of improper material in filling will undoubtedly cause disease when this area is occupied, and we would recommend that the Health Board be empowered to regulate the use of material.

Appended to this report may be found the answers to all the "schedule questions," as far as they pertain to this city, from "A" to "N," and a copy of the municipal regulations and ordinances relating thereto. Also, through the kindness of the Chief of Police, and the Chief of the Fire Department, we append the answers to schedules "O" and "P." We also furnish the answers to schedule "R" on public health laws and sanitary officials.

[SEE PLAN.]

We present a special map or diagram, showing two blocks or squares of tenements surrounded by privies, and the close proximity of these vaults to wells. These tenements are located at Constable Hook. They are two-story frame double houses, with halls from front to rear, and occupied by four families each, each family having one living room and two bed rooms, windows in each room. The contents of the privy vaults are liable to overflow in wet weather, garbage and house slops are thrown often from the doors on the open space in front, and the wells are becoming contaminated and unfit for use.

The diagram illustrates the evils that will arise if this manner of building is allowed in any section of the district.

QUARANTINE SANITARY DEFENSES.

THE QUESTIONS OF QUARANTINE AND EXTERIOR SANITARY DEFENSES OF THE NEW JERSEY FRONT OF THE HARBOR OF NEW YORK.

BY ELISHA HARRIS, M. D., SECRETARY OF NEW YORK STATE BOARD OF HEALTH,

TO EZRA M. HUNT, M. D.,
Corresponding Sec. State Board of Health of N. J.

DOCTOR: In complying with your request in regard to a review of the questions relating to the quarantine and external sanitary defenses of the New Jersey side of the harbor and bay of New York, I am rendering a duty implied in the instructions I received from the National Board of Health, in August last.

As the harbor and port of New York touch the eastern boundary of New Jersey at the high-water line, for many miles, and as the quarantine jurisdiction of this port is now recognized throughout the coast line of the four northern counties of your State, at tide-water, namely, Bergen, Hudson, Essex and Union, the co-ordinate interest of New Jersey in the sanitary protection of the Port of New York, is too obvious to require discussion by us.

We may usefully consider these questions of co-ordinate interests and the sanitation of the entire port; its shipping, its waters and whatever defiles them; its shores and reclaimed grounds, and its islands and its wharves, docks and basins, as being alike important to the commerce, business and general welfare of the people of New Jersey and New York. We may estimate the strict correctness of this view by the census of the shipping in port any day in the warm seasons, as we frequently enumerated

the official shipping lists last summer and autumn. The annexed summary shows how the vessels which were accounted for on the 20th of September, 1879, as in the Port of New York, were actually distributed at that date, these numbers and their distribution being fair averages for the entire summer and autumn:

At the wharves and docks of New York	165
" " " Brooklyn	279
" " " Jersey City	39
" " " Hoboken	23
" " " Weehawken,	38
In the stream at anchor	34
" Long Island City	14
" Amboy, for cargo or repairs	14
" Staten Island	13
" Elizabethport,	5
" Quarantine	14
Total	638

At the same time a great number of small vessels, engaged in local traffic and not enumerated in this list, were lying at various places within the New York quarantine limits, between the line of the Palisades, on the north, and that of the Blazing Star, at Woodbridge, on the south. The U. S. Customs District, of Newark, and that of Perth Amboy, comprise a tidal front, within which our enumeration of vessels was not extended, but the summary on the preceeding paper is exclusively of vessels that were entered at the New York Custom House.

The one hundred or more vessels thus moored constantly at the Jersey side, while nominally at the port of New York, constitute more than a tenth part of all the vessels constantly in the port. Therefore the question, "is New Jersey concerned in any of the quarantine measures of this port and of the nation?" is to be answered affirmatively. The corollary of this question is, necessarily, "*If so concerned,* how shall this extended or most populous region of New Jersey secure all the protection needed to maintain all the safeguards which her people and their commerce and vast investment and great thoroughfares require?" Let us proceed to answer these questions by examining the facts concerned.

The sanitary interests of the entire tidal front of New Jersey,

from Sandy Hook to the northern limit of Bergen county, sixty miles nearly, are identical with those of the port and city of New York, and with some fifty miles of the Long Island and West Chester coast-lines, which complete the opposite outline of this port. The history of the quarantine system in this port, shows that in 1758, when the peninsula of Communipaw and Bergen was a wilderness, the Colonial government of New York designated Bedloe's Island as the northern limit of the quarantine anchorage grounds. In 1794, the limits and the hospital station were changed to Governor's Island, to the great peril of the city of New York, and in 1799, the establishment was removed to Staten Island. In thus providing for her own protection, the State of New York secured the necessary safeguards for the Jersey side of the great harbor, as that shore was then, and until recently, occupied.

The port of Perth Amboy had its own sufficient system of sanitary defense, its quarantine law dating from 1799, and for many years its health officers acting in harmony with those of the quarantine office at Staten Island. Though Amboy was once menaced by a very limited infected district, and had, in certain years, numerous arrivals of infected vessels at her quarantine anchorage, the statutes relating to port quarantines in New Jersey remain very simple, and as regards the vast new city and rapidly-growing commerce of Jersey City, and the entire tidal front of Hudson county, the changed condition of things will not now admit of completely adequate sanitary police measures, in the nature of quarantine defenses, unless such measures are co-ordinated with those of the quarantine system of the port of New York. Even when so co-ordinated, there still must be such a sanitary treatment of the vast area of Jersey municipal front, at and near the tide-level, as shall prevent it from becoming the very soil, and nidus of pestilential infection.

With this in view, my general report to the National Board of Health has arrayed the reasons and various facts relating to this subject which I would but refer to in this statement.

The graphic descriptions and correct maps which the engineers and surveyors in your inspecting corps have presented will fully explain the nature and importance of the points to which I refer in thus saying, without further explanations, that

the tidal front must henceforth be so treated as to be prevented from becoming the very soil and nidus of pestilent infection. That this can be done we know; and that your faithful expert assistants and you, sir, have correctly set forth and judiciously estimated the sanitary problems upon which such protection and future well being will depend, I fully believe. Millions of wealth and yearly gains, and the health and welfare of a great population which are crowding the longest tidal front of the port of New York, demand this forethought and plan for permanent improvements, and a carefully devised system of sanitary works and expert surveillance that shall extend along the entire eastern side of Hudson county, and eventually be imitated along the front of Essex, Union and Middlesex. It is to this unequalled shipping front that the largest products of the American continent will come, and there we shall see the greatest unbroken length of the world's shipping depots and accumulated products awaiting shipment. Even before a half century will have elapsed there will probably be more than a million of inhabitants in the five tidal front counties we have just enumerated. The sanitary problems are momentous to that population, and even more momentous to this nation, this metropolitan port and to the world's commerce.

We now inquire what are and what should be the exterior sanitary defences of the Jersey side of this port?

It is safe to assert that the exigencies of commerce and travel are such upon the Jersey side, as well as in New York, that no exclusive dependence on the port quarantine can give the necessary protection against liabilities to the carrying and occasional planting of certain kinds of disease poisons of germs. The West Indian commerce will menace our water sides occasionally, and other pestilent infections than that of yellow fever may come. The quarantine system of this port must be maintained most skillfully and faithfully, and yet the local sanitation and the methods of public health administration should be so adequate that any and all contagia and the causes of pestilent maladies shall be controlled, prevented, "stamped out." This is *practicable*, therefore *it is duty*.

The port sanitation and the naval sanitation will, ere long, be, to a good and efficient degree, nationalized; but even when perfect in all respects we must not lean upon quarantine solely for

the absolute protection that this vast port and, most decidedly, the Jersey side of the harbor, will require. The mere rumor, in a foreign tongue, that there is a yellow fever scare, or even a relapsing fever alarm, in New York, Brooklyn or Jersey City, Bayonne or Hoboken, will, as the stupid world of ignorant people goes, secures the blind edict of a relentless quarantine, like that which Portugal enforced against the State of New Jersey last year. Let the world be well assured that we are automatically secure and in an unbroken state of sanitary protection.

SOME OF THE ESSENTIAL CONDITIONS OF ABSOLUTE PROTECTION FROM EXOTIC FEVERS.

The Jersey side of our harbor has been remarkably *saved* from yellow fever, yet the entire area below the outcropping of the trap-rock, an extent comprising more than half of Hudson county, now the reclaimed grounds along the harbor are to be included, is naturally fitted to be invaded by yellow fever and other exotic infections. Systematic drainage, extended parks and good administration of public health service, will render the entire district one of the most salubrious. We have witnessed a most insignificant invasion of that little peninsula you call Caven's Point, (the most southern headland within the present limits of Jersey City,) in September, 1856. A new stateroom mattress had been washed ashore in front of the old mansion, then a family boarding house, half a mile from any other dwellings. It was a tempting prize, and so freshly cast upon the tide from an infected vessel, that it was not yet sodden through with sea water. Four days afterwards, the master of the house slept upon that mattress, in an open hallway. He died of black vomit a few days later, and two or more members of his own family and six of his boarders took the fever. Two of the latter died of the black vomit, and four others recovered in the quarantine hospital, under my supervision. Another field-laborer was conveyed to the same hospital in a dying condition from yellow fever. These cases are quoted from a vivid memory of the events to show what is possibly a future peril. Be forearmed, therefore, and you will protect one of the most promising and affluent commercial districts of the world. Repeated personal inspections of the several miles of tidal fronts of Hudson county, from the time I received cases of yellow fever that were thus traced to

a bathing or boarding resort there, have enabled me to appreciate the facts to which this statement refers. The comprehensive schemes of commercial development of the entire harbor-front of Hudson county now compel attention, and invite some adequate preparation in regard to the sanitary problems that will inevitably be important to the port, as well as to the property and commercial welfare of the Hudson county front of it.

About 3,600 acres of salt marsh and tide-washed shoals are being reclaimed and will, in the course of a few years, be covered by the structures that commerce and a busy population will need to find well defended against all sources of pestilential disease. Unless so defended, those 3,600 acres and homes of a million of inhabitants of the four contiguous counties may be frequently in jeopardy. Not only may the exotic germs of yellow fever menace that extensive area of made-ground, but the sources of evil will become inherent in that ground if its very grading and substance are not protected from the errors which we already witness in various places that are now being filled and built upon, in the absence of competent and faithful engineering plans. On the other hand, we now witness good work at certain points along the ten miles of front where improvements are in progress. We would recapitulate from notes taken while on the grounds and waters here mentioned, the following points relating to the protection which *local sanitation* should add to all that any rational quarantine service of the port can render:

1.—The filling, grading and artificial drainage of the reclaimed ground require skillful engineering, to secure every portion of the low lands and water front from becoming sodden with filth and sewerage. Though saturated to the plane of high tide level, all these grounds should be so treated as to remain free from mephitic emanations and be as clean and dry at the surface as possible. To permit these grounds to remain undrained, as they would be if not drained by a system separate from the sewerage, or to permit them to be badly sewered, or the sewerage to be debouched along the docked and bulkheaded front, would create an inviting nidus or prolific ground for propagating dangerous disease.

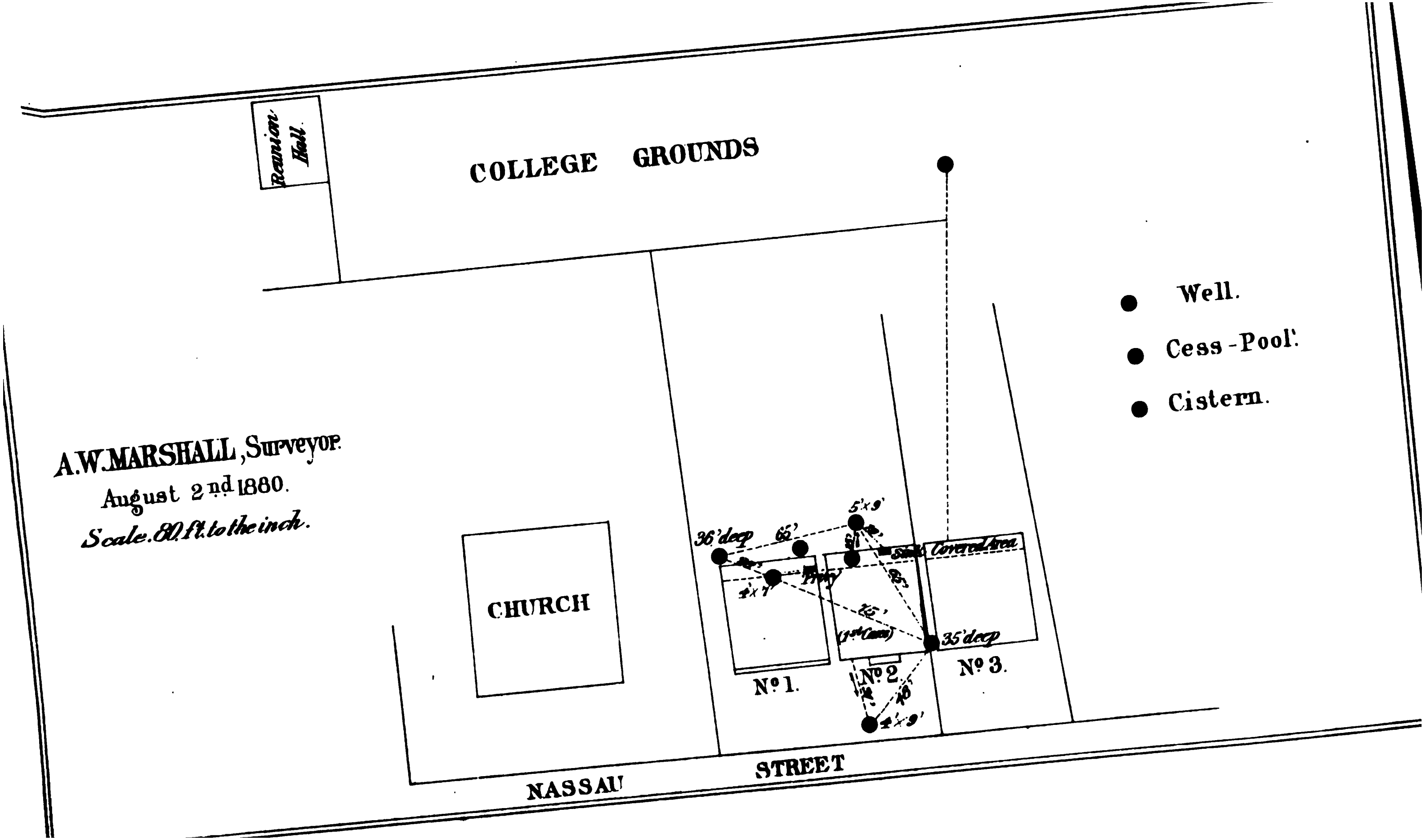
2.—All wooden crib structures along the tidal front or the streams, whether to facilitate the filling and bulkheading, or to

serve as the bases of docks and wharves or buildings, will prove to be snares and unsanitary conditions when too late to be prevented.

3.—The Hudson county sanitary authorities, or the State Board of Health, will need refuge or exterior sanitary station, within easy access from any portion of the region of New Jersey, comprised within the U. S. customs districts of New York, Newark and Perth Amboy. This, as a matter of prevision and specific plan and method, is all we here can mention. The facts stated by you, sir, in the Third Annual Report of the State Board of Health, concerning a temporary arrangement with the quarantine authorities of New York, convey a correct idea of both objects and means in regard to such an exterior safeguard. That which was extemporised last autumn as a substitute for an independent sanitary refuge or quarantine lazaretto and boat for the immediate segregation and removal of *infected persons and material*, may be rendered so permanently a ready method that New Jersey shall never lack a perfect preparation for this exterior sanitary police service. The peculiar advantage of such an arrangement for acquiring the benefits and all facilities of the New York quarantine islets, lazaretto and transport steamboat is that of entire fitness, certainty and promptitude of the sanitary duty itself, especially if Hudson county will maintain a convenient boat landing at its old alms-hospital front. These facilities would give some very desirable kinds of protection to the Jersey side of this port, and would prevent needless and harmful alarms and exposures as regards the portable pestilences to which the shipping and the railway depots may at times be subject.

4.—In conclusion we notice that the method and almost undefined limitations of the *riparian* titles and properties, as at present acquired by individuals and corporations, under the New Jersey statutes, do not seem to recognize the obligations which may become due to the sanitary authorities. This is not here mentioned as a criticism, but simply as a fact which readily may be remedied without any impairment or invasion of the riparian rights. To protect by the safeguards of law and of official surveillance all and any of the extended harbor front of your commercial districts, is tantamount to a protection and insurance, and even an enhancement of the cash values of every

portion, while by this means all burdens of quarantine and of nuisance litigations may be prevented. But it is less the present than the future interests we here allude to; and we must consider that as the State is now rapidly selling these riparian properties, as mere property, without reference to the sanitary questions which will be important in a near future, the present is the proper time for this suggestion.


Reunion Hall.
COLLEGE GROUNDS
Well.
Cess-Pool.
Cistern.
A.W. MARSHALL, Surveyor.
August 2nd 1880.
Scale. 80 ft. to the inch.
CHURCH
36' deep
65'
5'×9'
4'×7'
Privy
Covered Area
35' deep
No. 1.
No. 2.
No. 3.
4'×9'
NASSAU
STREET

ENTERIC FEVER AT PRINCETON.

BY EZRA M. HUNT, M. D.

The State Board of Health of New Jersey commenced an :amination into the sanitary condition of Princeton, on Tuesday, ay 25, 1880. Vague reports had reached us that a fever of an termittent or remittent variety was prevailing among the udents of the College. One student had died a week after moval to his home, but it was claimed that the fever had no ecial type, and the fatigue of transfer had increased the severity ' the symtoms. The disease was spoken of as malarial fever, a rm not in use in any diagnostic sense in medical nosology. No se dates earlier than March 23d, probably none earlier than pril, during the first week of which several cases commenced.

THE TYPE OF THE FEVER.

Careful inquiry as to the symptoms and cause of the disease, d other physicians, as well as myself, to entertain the belief at all the cases could not be identified as of the usual periodic 'pe.

There seem to have been no new and well-declared cases in pril, after the first week. It would appear from inquiry among udents that many were complaining of headache and a depressed condition of vitality, and many were taking some tonic edicine. But few were interrupted from class attendance until out the 8th to the 20th of May, when there was a decided crease of sickness.

On the night of the 25th, a student died somewhat suddenly, ter a sickness of ten days. His case had been called malarial ver, or towards its close typho-malarial. The State Medical ociety of New Jersey was holding its annual session, at Prince-

ton, at this time. Some of its members, who had sought careful detail of this and the previous cases in April, were convinced that the fever was endemic in its character, and not of the usual remittent type. The case referred to had been seen that day by one or two of our most competent medical men. They had no doubt that the patient died of typhoid fever.

In addition we have reason to think that a majority of the students were not in a ccndition of health, such as generally exists in this college.

During the months of April, May, June and July, there occurred, in all, about forty cases of this, or a kindred type of fever, and eight deaths. The physicians of Princeton, some of whom regarded their first cases as remittents, and some of whom claim that there were cases that showed no typhoid element, nevertheless recognize that in the cases that proved fatal and some others, the fever was distinctly typhoid.

Of one of the first, if not the first case, I have the following detail from his own brother, an able medical practitioner.

PATERSON, June 5, 1880.

DEAR SIR:

Your letter to Dr. H. of Glen Gardner, was forwarded to me with a request to reply. My brother left Princeton April 8, 1880, reaching home in afternoon of same day, very much exhausted. He had complained of being sick some two weeks before leaving P., though able, through considerable effort, to prosecute his studies. While in P., his symptoms were loss of appetite, alternating diarrhœa and constipation, headache, slight fever and general prostration. Upon his arrival home, he at once took to bed, complaining of general lassitude, nervous irritability, fretful, and fearful concerning his recovery. My brother was telegraphed for on Saturday, the 10th, but did not get there until Sunday, the 11th. He found him as above described, except a sore throat. His first impression was that of typhoid fever, but on the following morning, he noticed what seemed to be the remains of a diptheretic membrane with general pharyngetis. The next day, Wednesday, I was telegraphed for. I left immediately, arriving there at 11, P. M. I found him with temperature 105°, pulse, 140. He had been delirious all day, and was partially so on my arrival. Under large doses of quinia and sponging, his temperature marked 103½°, at 8 o'clock, Thursday morning; in the evening of this day, it reached 104½°. On Friday morning it again fell to 102¾°, but in the afternoon and evening of this day it again went to 105°. Saturday it continued

nearly the same. Sunday there was no accurate temperature taken, as you will observe the reason where a full history is noted. He died early Monday morning, (1 A. M.) April 19th. The pulse, during the days before Sunday, ran from 120 to 140; but on Sunday it reached 160 and 180, and so feeble and rapid that an accurate count could not be made. There was delirium all this time of an active character. He was, until Sunday, able to recognize an acquaintance, and call out the name when requested, though he was unable at any time to understand a conversation or to make an intelligent reply, or in condition for any one to converse with him the last four or five days before death. The tongue was exceedingly dry, swollen and cracked; the fauces red, and the same general appearance as the tongue. There was, at times, a considerable secretion of yellow, tough mucus in his throat, which caused a good deal of choking. It was necessary, at times, to clear his fauces and mouth with the fingers and wet rags. Sordes covered the teeth. There were involuntary discharges. On Friday, the stools were largely of blood, and were quite copious. The abdomen was tympanitic and very markedly so Friday, Saturday and Sunday. Milk and other fluids were vomited the last two days. There began, on Thursday, a considerable jactitation. The flexor muscles of the arm and fore-arm were in an almost constant state of clonic contraction; this extended to the muscles of the neck, face, jaw and eyelids. This agitation increased in extent and violence each day until his death. The hands were fixed firmly upon the fore-arm, the fingers left their imprint on the palms of the hands and the fore-arm upon the arm. He needed constant assistance and great force to control the constant movements. The muscles of the lower jaw were in such a constant tremor that it was almost impossible for him to swallow. The muscular spasm did not extend to the lower extremities until the morning of the 18th, the day preceding death, when the flexor muscles were more or less involved. There was none, or at least very slight, oposthrotonos. I think the head was thrown back slightly, though probably due to the spasm of the muscles of the neck. There were a few (three or four) rose-colored spots over the abdomen, which resembled typhoid fever spots; they disappeared under pressure; they were not seen only three or four days. The vomiting was probably partially due to the extreme tympanitic condition. His tongue was exceedingly dry and cracked, and at times he was unable to protrude it between the teeth. The teeth were completely covered with sordes. My diagnosis was typhoid complicated by irritation in basilic and upper spinal region. If there is anything more you would like to know, address me here and I will write at once.

Respectfully yours,

G. W. T

Two cases which I saw in the earlier stages, about May 27th, were distinctly typhoid, and were so considered by the attending physician. On May 31st, being summoned by telegraph to see Dr. Wycoff, who had been taken ill, I saw for him his fever cases, six in number. Of these, four had the typhoid rash, and all had the symptoms generally accompanying typhoid fever. Prof. Austin Flint and Prof. E. G. Janeway saw other cases which satisfied them that the disease was enteric fever. I have heard directly from several cases which were treated by able physicians, at the homes of the students in other places, and which were distinctly recognized as typhoid. In the cases of death, most of them had serious hemorrhage from the bowels, and in one case death was sudden, as believed, from perforation of the intestine. Most of the cases had the rose-colored or lenticular eruption. The only case in which a post mortem was hoped for failed by delay of communication, but it scarcely seemed necessary to confirm so many agreeing diagnoses, except as such evidence is always valuable as corroborative. There were, in some cases, variations such as raised the question whether there is a fever which may be called sewer fever, in which the blood poisoning is modified from the abdominal typhus of the Continent or the typhoid of Great Britain; also whether in two or three of the cases there was a malarial element sufficient to justify the term typho-malarial.

Two years previously we had under observation, under similar circumstances, over one hundred cases of typhoid at the Reform School, at Jamesburg, which, like some of these in their inception, were regarded as remittent. A study of the details of that endemic, as given in the State Report of 1878, is an instructive introduction to the etiological study of this Princeton outbreak. Its last page of warning may get new emphasis from this trying repetition. The study of the two, side by side, while showing some of the milder types of the disease, some of those variations which are recognized, do not affect the identity or the identification of the fevers.

COURSE OF INVESTIGATION.

From verbal inquiries made, I became so concerned as to the probability of local existing causes, that I remained after the adjournment of the Medical Society, on the 26th of May, for the

purpose of knowing as to the water supply, and examining into the sewer and indoor appliances of the college building, so as to confer with the other members of the State Board of Health. It did not take long to discover some serious local defects, and such as made it evident that it would be our duty to make an examination in detail. A note addressed to our Board the next day, by the City Clerk of Princeton borough, asked an investigation in the interests of the town. The death of one student on the 25th instant, and of another on the night of the 26th, who was suffering from fever, together with the opinions expressed by many physicians, caused much alarm. On the 27th, I telegraphed to the City Clerk to hasten forthwith the organization of a Local Board of Health, which had been neglected. The 28th I returned to Princeton to carry on the work of investigation, and continued the examination of the water supply of the college buildings, and its entire system of sewage.

WATER SUPPLY OF THE COLLEGE.

The supply of water was derived from a spring on the ground in the rear of the college buildings. This spring was carefully covered and protected from all outside contamination. The fall previous it had threatened to fail in furnishing an adequate supply of water, and so had been enlarged into a kind of well. It was about eight feet deep, and collected the surface-soil drainage from the direction of the college property, through a soil fairly adapted for percolation, along the row of buildings nearest to it. Several hundred feet distant had formerly stood the privy resorts of the college. It was known to the secretary that several months before, in an examination of the underground of a dwelling house on this line, there had been found an amount of organic material out of all proportion to any natural condition of decaying substances in soil. The examination had been made on account of sickness in the family. While it was alleged that this was local and that the trend of the underground was such as to feed this large surface-well from another direction, it was plain that such a source of water supply can only be relied upon when it came from surface soil kept clear of organic filth of all kinds.

So long as such a spring or surface-well is in an open country district, and so long as the ground soil through which it perco-

lates is fitted to act as a filter, and is itself free from undue organic matter, the water is likely to remain pure as this seems to have done. It had of late been carefully watched and examined by the Professor of Analytical Chemistry. There is not reason to believe that up to this time it had suffered from the infusion of any sewer material into it, or that it had become fouled by organic matter in the soil. Yet as increase of population in a town like this always subjects natural surface springs to sources of befoulment, it is not safe to rely upon such an one for a large permanent water supply in such a locality.

RESERVOIR.

Another question as to water supply arises from the method of storage. This water was carried by an iron pipe to a reservoir situate about fifteen feet from a large artificial pond, formed by the damming up of the storm and drainage water from the direction of the college buildings. At one time more recently, the water in the reservoir was found on chemical test to be of a lower standard of purity than that of the spring tested at the same time. The amount of water used in the college buildings also leads some to believe that the reservoir obtained a supply not only from the spring but also from the adjacent pond and grounds. It was not a cemented reservoir.

It is probable that the reservoir had, at times, some supply from such sources. Although this might give more of the products of vegetable decomposition, it is not so seriously different in source from the spring supply as to furnish adequate reasons for the prevalent sickness. The water from this reservoir was pumped, by an engine, into one of the colleges, and from tanks, distributed to the various buildings. These tanks were never intended to become dry, and have never been known to be but once or twice. The tanks were not, in every respect, the best, and yet nothing was found in these to account for the sickness. While then this water supply, as a permanency, cannot be depended upon, it is not believed that, up to this time, it had been the cause of any sickness of a typhoid character.

IMPERFECT DRAINAGE.

A question here arises whether any evil results, in the form of fever, did occur from the ponding of water and the interference with natural drainage, which is to be found in the rear of the college buildings. Since, it is claimed that, beside typhoid, there were some cases of remittent and intermittent fever.

The ground below it in the vicinity, is wet and somewhat marshy, and is in a condition favorable to interrupted or abnormal vegetable decay. Water is now believed to be a conveyancer of miasma, when it is derived from low ground and from a marshy vicinity. The evil cannot be detected by chemical examination. Both the well which furnishes water to the college, and the undrained ground which furnishes malaria to the air, could easily furnish elements which, combined with local complication of a nosocomal nature, must give rise to a fever of typo-malarial character. Princeton is naturally one of the healthiest of towns, and free from malarial influences, as the testimony of all the resident physicians shows. It can only be made unhealthy by neglect of, or interference with natural drainage, and by the accumulation of evils incident to congregated life. While we believe the drainage of all this district has been somewhat neglected, and much construction done without proper preparation therefore, it is not probable that this was the existing cause of the outbreak.

While thus presenting the facts as to the drainage and water supply of the college, our conclusion is that we were unable to find in it adequate reasons for the outbreak of disease at this time.

HEATING AND VENTILATION OF THE COLLEGES.

As the fever had occurred in the spring, it was not found necessary to make an exhaustive examination as to the modes of heating and ventilation in the college buildings. The heating of all the dormitory buildings is by open grates or stoves, with the exception of Reunion Hall, which is heated by steam coils. While some defects might be noted by experts as to facility for natural ventilation, yet none of those examining the buildings were disposed to attribute the sickness to structural defects as to these matters.

SEWERAGE AND WATER-CARRIAGE SYSTEM.

Our first examination, made on May 26th, was in three of the buildings, commencing in Witherspoon Hall. It was found that each entry was supplied with a small iron trough, similar to a kitchen sink. Over each of these was an iron pipe with a faucet communicating with the tanks and water-supply already described. All water used in the college was furnished from these. These troughs received all the liquid slops of the college, including all waste and chamber water. These had the S or Adee trap and ended in an upright soil-pipe. This passed from the various stories of the building into the continuous soil-pipes, until from the various directions they united at the Witherspoon Hall, carrying the liquid refuse, and also receiving the storm water from the leaders in time of rain.

Near where the soil-pipe and water closets pipes join, and on the inner side in Witherspoon Hall, there had been built a ventilating flue connected with the chimney, for the purpose of securing perfect ventilation between the large sewer main and the buildings. There had also been made a man-hole or ventilation opening into this main sewer, a few hundred feet in the rear of Witherspoon Hall. The workmen seemed to have mistaken the ventilating flue for a part of the chimney stack, and had gone round it with the sewer or soil pipes, avoiding connection. The man-hole outside had also been made tight and covered with ground and sod. So there was no inlet for air between the sewer main and its cesspool, and the water closets and entry sinks of the colleges, save what might be furnished by the storm leaders near the roofs; these, in times of storm, might siphon the ventless traps. The pressure of the sewer gas must often have been sufficient of itself either to siphon the traps or to force itself through. It is known that these traps were, at times, empty. This is made still more obvious, as we follow on, to notice the condition of the cesspool at the terminus of the sewerage system. This tank was built underground, beside the railroad track; it is an oval, fifty feet long, eleven feet deep, and eleven feet in its oval diameter; at each end it had a man-hole covered with a heavy iron lid closely fitted and covered over with earth. This cesspool was not cemented on the bottom, and was laid with loose stone part of the way upward; the sewer system from the

college entered it by a pipe about four feet from the top; there was an overflow pipe at the other end, two feet from the top, which thus made a water seal, and had generally served to carry off the super-abundant sewage by a pipe running for a few hundred feet underground and finally discharging itself along the railroad and upon the surface of a low tract of land. It apparently had been thought that the cesspool with its uncemented bottom would absorb much and that the rest would easily flow off, and that if, at any time, the floating matter in the cesspool become solid or cake-like, so as not readily to flow off, the flush of storm water from the roofs, at intervals, would answer for this purpose.

Prof. Brackett and myself first got access to it May 27th, one lid having been loosened the day before. This large cesspool was full nearly to its top with a black, tarry, offensive sewage. This covered the incoming sewer pipe from the college to the depth of two feet with a semi-solid mass, from which the foul escaping gases were bubbling. It was so tenacious as to stop up the entrance of the sewer pipe from the college, except as the back pressure become sufficient to cause an intermittent discharge. All sewage came from that direction without getting vent. The pent up gas in the pipes had but one ready escape and that was into the college buildings. Thus the soil pipe and water-closet system of the college was but an elongated cesspool with full arrangements for gas-discharge on each entry, both from the slop and water-closet apparatus, as the pipes of the latter joined the former near the buildings. Although the large cesspool had at its lower end an overflow pipe, intended each day to carry off any surplus, in the warm months of this spring, and the absence of rain, the mass between it and the sewer pipe had become too solid to be easily flushed off and too putrid to be retained.

With right traps in the buildings, with perhaps the addition of opening to the soil pipes on the roofs, and also vents to the traps as recommended of late, with the intended attachment to the chimney flue, and an open man-hole for free access and egress of fresh air, with watchfulness over the cess-pool to see that it was in working order, and with emptying when required by contingencies or by lapse of time, we can easily see how such a system might have been operated. But as it was it had been converted into a complete system for the storage of the

fouler part of sewage, so that its gases might be sent to the college buildings with the same precision with which lighting gas is kept in a reservoir and distributed through houses. Only in this case there must have been more constant escape. At the time of emptying this cess-pool, immediately after the adjournment of the college, there was also some sewage inflow from the direction of the colleges. All the buildings known as Witherspoon Hall, West College, Reunion Hall and East College, as well as the University Hotel, were connected with this system.

The School of Science and some other buildings were connected with just such a system and with like defects, which had its terminus in a smaller cesspool on Smith street, and was in no better condition. It is easy to see how, by such a state of affairs, the air of the college buildings could be laden with particles or so impregnated with aerial sewage and gases as to be deleterious to health. There can thus be no doubt that in the college buildings, in the University hotel and in one of the Professors' houses, there were found soil-pipe and water-closet connections highly favorable for the introduction and extension of foul air in the form of aerial sewage.

Only two questions confront us: As a matter of fact, did the disease commence in the college, or from a similar or still worse condition, in a students' boarding house? Wherever it commenced, was it of spontaneous or local origin, or was it introduced from some other focus, and then spread by these favoring and fertilizing provisions therefor?

FIRST CASES.

To throw light upon these questions, an examination of the earlier cases is of primary importance.

By the kindness of the college authorities, I early received a list of all known cases, with the places of rooming and of boarding specified, and have verified the dates of attack. These are given without repetition of the names, and with some slight alternating corrections, as furnished by personal inquiry and correspondence.

	ROOM.	CLUB.	REMARKS.
[illegible] CASES.	A House No. 2	House No. 2	Remittent fever; Scarletina, (?)
	B 13 S. E.	"	Left here April 8th. Died 19th.
	C 10 W. M. Witherspoon	"	Left here sick early in April. Had Typhoid fever at home.
	D Dohm's	"	Left here April 5th or 6th. Typhoid fever at home. Dr. Fay, Altoona.
	E 10 N. R. H.	"	Sick in Princeton with Typhoid fever early in April.
	6 N. M. R. H. Colored housemaid.	"	Left April 1st. Sick at Auburn with nervous fever. No Typhoid fever. April 29th, removed. Sick two months.
WITHERSPOON HALL.	F 10 E. W. H.	Univ. H.	Chill May 16th. Died May 26th
	G 12 E. W. H.	"	Went home sick May 24th. Typhoid fever at home, Madison, N. J.
	H 5 E. W. H.	"	Went home sick May 25th. Sick at Manhattan Beach Hotel.
	I 4 W. M. W. H.	"	Sick here May 12—26th. No Typhoid development.
	J "	"	Sick May 23d. Still sick here, (Aug. 20).
	K 2 E. M. W. H	"	Sick and went home about May 24th. Came back about June 1st for part of two days. Returned home and died June 6th.
REUNION HALL.	L 5 S. M. R. H.	Jesse Williams	Sick here from May 9th to 27th. No decided typhoid symptoms.
	M 15 N. M. R. H.	Univ. Hotel	Went home sick May 24th. Had Typhoid fever. Wilkesbarre.
	N 7 S. R. H.	"	Taken sick about May 15th. Went home May 22d. Died June 10th. (?)
EAST COLLEGE.	O 13 N. E.	Lavake's	Took cold, April 1st, lying on ground. Went home May 20th. (Doubtful case).
	P 18 N. E.	Univ. Hotel	Went home sick May 17th. Had Typhoid fever.
WEST COLLEGE.	Q 3 N. W.	Mrs. Harvey's	Taken sick about May 20th. Very marked case. Died July.
	R 6 N. W.	Univ. Hotel	Same as above. Died July.
	S 1 S. W.	Clow's	Left about May 15th. Returned May 20th. Went away again May 25th. Sick in Newark. Died June 5th.
ROOMING AND BOARDING IN TOWN.	T M. House, No. 22	Parkhill's	One of the first sick, about March 14th. Went home about April 12th. Returned to Princeton about April 17th, and was again sick for a few days, but recovered here. Attended by Dr. Wikoff, who says his was not this fever.
	U M. House, No. 19	Univ. Hotel	Went home sick May 26th. Called Remittent fever up to May 31st. Died June 6th.
	V Mrs. L.'s	"	Went home sick about May 26th. Typhoid fever in New York.
	W Mr. L.'s, Canal street, previously at Lavake's	"	Had chills and fever about March 1st. Went home, returned, and was taken sick about May 10th. Typhoid symptoms.
	X Univ. H.	Univ. H.	Complaining during second session while in 12 W. W. H.; moved to hotel about April (?) 21st. Died May 26th.

It is at once noticeable that the first seven cases of sickness occurred among those who cannot be associated as in any one part of the college buildings, or in any one place in town as to rooms, but who were alike in the one particular that they all ate in the same house. Of these, two lived only in the house, and one other had a room in town elsewhere. The others were in three different college buildings. One student was slightly sick in April who was not of this group—although named in another part of the list, it is evident from the account of his brief indisposition that he had no typhoid symptoms. Of these seven, six are reported to me as having had typhoid fever, unless one called nervous fever is an exception. Four of these were taken to their own homes and recognized as typhoid fever by their physicians there. The seventh one is claimed to have had remittent fever, and to have broken out with scarlet fever after he had been in his room over two weeks. His case was reported as beginning March 23d. The first student who died, and whose case has been already related, was taken sick March 26th, or as the brother's letter would date it, about two weeks before April 8th. Four other cases were taken so simultaneously, April 5th, as to lead the physician to suspect that there was some local cause and to make inquiries as to the well water, etc. Previous to these cases there were none of earlier date, which, before or afterwards, were identified as typhoid. These facts are so significant as to invite to close inquiry.

HOUSE NO. 2.

This boarding house was situated on the main street known as Nassau street, being the second house west from the First Presbyterian Church. One student boarded with the family and roomed in the house. The family consisted of four adults, including *servants, one of whom* had typhoid fever about April 25th. Two clubs boarded in the house, one consisting of thirteen college students and the other of thirteen seminary students and a college tutor. Why none of the seminary students sickened can be accounted for, the same as why only seven out of the whole number in the house sickened, or on the hypothesis that college students sickened because of the additional and constant exposures in the college buildings, or on the hypothesis that the cause of the sickness was only in the

colleges. Against this latter is the fact that so many sickened here and here only at first; that one was a servant in the family, and that one other not including the remittent fever case, roomed as well as boarded outside of the college. As two other houses were in close proximity and had either water or cesspool relations, we show on the accompanying map their position, the middle house being the place of sickness.

[SEE MAP.]

This house, No. 2, derived its drinking water and its upstairs wash water from a well located between houses No. 2 and 3, the houses being separated just enough to allow space for the well. The well is about thirty-five feet deep, and very old. The first sickness led to an examination of this well. The water, although it had not been complained of, was found so bad on chemical analysis, that Professor Cornwell thought that it could not be defiled by sewage alone. We tasted it in June, after it had ceased to be used, and could detect no foul taste, although it was chemically impure. In the front yard of house No. 2 was a covered cesspool, forty-eight feet from the well. This received the water-closet excreta of the house, and the bathtub water. The size is about nine feet deep by four wide. When examined, about one foot of semi-solid fetid matter was in the bottom. As the structure directly beneath is rock, the cesspool matter all along this section is only absorbed and disseminated laterally.

The next nearest cesspool is in the rear of lot No. 2, nine feet deep and five wide, and sixty-five feet from the well. At the time of examination in June, it had seven feet of water and filth.

In the yard of house No. 1 was another cesspool found in a still fouler condition, into which both the kitchen slops and water-closet refuse was received; this was seventy-five feet from the well of No. 2, with a foul privy in between. It was only twenty-eight feet from the well of No. 1, which was foul, and which is of the same depth and same water-bearing strata as the well of No. 2.

The only chemical difficulty in discovering whether sewage matter was percolating from these three cesspools into the well of No. 2, arises from the fact that there was a dead cat in the well. There was so much cat as to make it difficult to determine whether three cesspools, distant forty-eight, sixty-five and

seventy-five feet respectively, were also fouling it. The Chemical Professor thought there was more of the chlorides and albuminates than the cat would account for. The well is large and deep, (thirty-five feet,) and like most of the wells of Princeton, of this depth, cannot be pumped dry by usual method.

This water was used for drinking purposes and to different amounts by different students. Some of it was each day pumped into the up-stairs cistern for general water supply, communicating chiefly with the room in which one of the students was sick several weeks.

Besides these conditions, as to water, the house was provided with unusual facilities for the introduction of foul air. The cesspool of house No 1. was in the area, within twenty-eight feet of house No. 2, with the privy a few feet nearer. The rear cesspool of house No. 2 was fourteen feet from the house, and had from it an untrapped pipe in the area basement for receiving slops thrown into the sink. There was a rain water cistern under the piazza, which had its overflow pipe into the cesspool, and which thus let foul air into the area. Then in the brick floor of the basement there was an outlet for slops. In heavy rains the cesspool overflowed its filth water into the area so as to cover it. The dead mawkish odor, peculiar to confined sewage, had been frequently observed. As the property, when purchased, had these conveniences, the localities of cesspools, pipes, etc., and their connections were not known. The soil, beneath and about the building, was saturated with organic matter. The condition of the water supply, added to that of the cesspools, presented a more flagrant and dangerous complication than any found in the college dormitories. Both Professor Janeway and myself, who had occasion to act with E. S. Philbrick, of Boston, as a committee for advising what changes should be made, came, therefore, to the conclusion as herewith expressed.

"The disease was typhoid fever, caused in the first instance by the use of water from a well, which was proven by chemical analysis to be impure, in which a dead cat was found, and having such relations to cesspools, as shown by subsequent investigations, as to render its contamination by them extremely probable. We have been forced to this conclusion by the fact that the first cases of typhoid fever amongst the students during April, occurred in those boarding at the house using this well water, and

because these students who became ill lived in different buildings. Moreover, it has since been ascertained, that a servant who worked at this house, became ill at this same time, was removed to another house, and is considered by her physician to have had typhoid fever.

The evacuations from the students who had become affected in this manner were thrown without disinfection into the sinks and water-closets in the dormitories, and gained access to the sewer system of the college, and to the cesspools which formed a part of it. A subsequent outbreak of the fever occurring in May, was caused by the infection of the sewage of the college, contained in the aforementioned cesspools and pipes. On this occasion the disease was not limited as before, but followed the sewer distribution. The poison gained access through the sinks, water-closets, and the pipes connected with them.

The spring water used at the college has been analyzed a number of times, but without affording any evidence that it was contaminated; and we are informed that it has been used at several houses having a total population of about seventy persons, but having no connection with the sewer system, and that there has been no sickness in these houses. The view might be entertained that the foul-air conditions of the house co-operated with the water conditions and shared prominently with it in incipient causation, but at any rate it seems well-nigh certain that the local structural conditions in and about the house were the exciting cause whether through fouled water or fouled air."

WAS THE FEVER SPONTANEOUS IN ITS ORIGIN AS AN ENDEMIC HERE?

The question now arises whether the enteric or typhoid was implanted in such a favoring soil from some other person or locality or whether it originated amid these favoring conditions. It is well known that on such a question there are still two opposite opinions. One class of medical observers maintains that like small-pox "the disease breeds so true that no fresh case is known to arise except by contagion or infection from some previously existing case." As the view has gained ground that the specific element in the communication of diseases associated under the name "zymotic" is not volatile but "particulate" in that it is in substance not gaseous but solid, and so a particle, it must

be conceded as Russell has recently expressed it, "that the progress of discovery on the laws of the particulate theory of the contagia makes constant inroads upon the domain of the spontaneous or transcendental in the origination of communicable disease." So there is maintained "in the mind of the ætiologist a wholesome attitude of thorough skepticism as to the spontaneity in any instance of diseases known to be in some instances lineally propagated from pre-existent cases through ascertained media."

Dr. William Budd may be quoted as representing those who always look for a pre-existing case from which the infective particle was derived, either in person or through air or water, contaminated by the fecal discharges of the patient, while Sir William Jenner and Dr. Murchason represent those who, while recognizing this source, also believe that it may be generated independently of any previous case, and especially from excretions and from sewer fermentation and decompositions.

Dr. George Wilson, in his recent book on "Healthy Homes," says, "some writers maintain that genuine typhoid fever can only be propagated from a previously existing case or cases; but there is a constantly increasing amount of evidence which goes to prove that it is often induced by sewer air, foul effluvia from cesspools or polluted water, independently of any previous cases." (pp. 293.)

It therefore becomes the duty of any investigator—even if finding conditions highly favorable to the epidemic extension of any disease—to inquire whether its origin, after all, was not from some place, whither it had been brought either by a person sick of the diseases or by some medium that might have been infected from him or from his sickness. It has been said that enteric or typhoid fever is the most versatile of all the communicable diseases in its choice of a medium. (Russell.)

Since the conveyance of typhoid fever through milk that has either been watered with fouled water, or has absorbed infectious material from typhoid surroundings, has been proven, our first inquiry was in this direction. No clue could be found to any possible derivation from the source. Care was taken to trace the first cases to their home relations, to their absences from college, or to some other circumstances that might furnish evidence of transportation. While in the case of so composite a gathering, and of so many conflicting statements which have to be elimi-

ıd, it is well nigh impossible to make such an inquiry exstive. After tracing carefully every possible or suspected ·ce, we were not able to identify this as an imported disease. ɜral suspected sources failed under extended investigation. next natural inquiry was, whether cases of typhoid fever previously occurred in other parts of Princeton, the infecof which might have, in some hidden manner, reached the lity of house No. 2, so as partly to assume an epidemic form. was found that it is true of Princeton, as it is of most such l towns with no Boards of Health, that causes for local diss exist. Also that occasional cases of typhoid fever occur as ıght from without. By careful inquiry of the resident sicians, and examination of the vital records, it was found there had been no case of typhoid fever in Princeton preıs to this outbreak, within two years. Six years ago, and n five years ago, cases occurred in town which were known ave been brought from other places. Three years since there ɜ five cases in one family. In these cases it was believed he time, after chemical analysis, that a filthy cesspool had ıd its way into the well, so as to foul the drinking water.

wo years ago last March, there were two cases in a professor's ily, who lived in a hired house in the town. The well had ɘ dry, and it was necessary to blast in order to deepen it. ır the water was secured it began to taste badly, and an odor perceptible from the well. The sickness soon occurred. It believed in the blasting a crack had been made which comıicated with a cesspool. The well was abandoned and ːward filled up because of its odor. We could not obtain any which would, after so long an interval, associate any of these s with those now occurring.

s it has been alleged that low forms of fevers have before preed at Princeton, we examined closely the records so far as ilable. We found ex-President MacClean, from a ready memable to give details which were corroborated by Dr. Stephen ĸander and others. The record, both of the college and the n, has, with rare exceptions, been one of remarkable health. s said that twenty years at a time have elapsed without a ;le death of any student from any sickness at Princeton. ıittent fevers, except about the time of the digging of the ıl, long years since, have been almost unknown. This year,

in the surrounding country, there has been more than usual of remittent and intermittent fever. It has generally been so rare that all the physicians have regarded any occasional case as an importation. Yet it is evident that structural changes, excavations and interferences with natural water-courses need here, as elsewhere, to be guarded against or compensated for. Three cases of typhoid fever occurred in the house of Dr. Farmer. He died, as did also one student of the college.

In 1835–6 occurred what has been spoken of so frequently since this outbreak as the *Princeton fever*. It was confined to one house and this happens to be house No. 1 of our map, and what may be regarded as a part of the same plot in which the first case occurred this year, since it is only separated by a few feet used in common. In the house, now occupied by Dr. S. Alexander, there were then five deaths from typhoid fever, and one or two more who recovered after prolonged illness. One student died and two physicians in succession. The sickness was attributed to the well, which was found to be receiving the household slops. The well was long known as the *sickness well*, and was abandoned for about two years, but is now used, although found in bad condition at the time of our examination. No sickness has occurred in that house since, which could be attributed to any local causes, although the family of adults is believed to have suffered in general health from impure air and water. The fact of locality, so far as the present epidemic is concerned, we can only regard as a coincidence, and as having no causal relation. The fact of a graveyard having once existed in the rear of house No. 2 was also brought to our attention. It was found that some seventy years ago there were, several hundred feet from the house, five or six gravestones, probably the remains of some family ground before the college was located at Princeton. "There have been," said President MacClean, "no burials there in the memory of man."

It would seem, from all the facts that we gathered, that typhoid fever commenced here only because of certain more recent and local structural conditions, and was extended into an epidemic by prevalent conditions in the college, as also in a few houses in town.

That the fever did not get a more rapid and disseminated hold at the time, is to be accounted for by the fortunate occurrence of

the Spring vacation, and the fact that none of the earlier cases remained in the college buildings. About two weeks after the return of the students, April 22, new cases began to appear, which might easily occur from excreta, or the continued operation of the same causes, or from the predisposition which had been established.

So soon as the cases were recognized as typhoid fever, dependent upon local causes, all officers of the college were prompt in ordering an adjournment. We believe thus only was it saved a far more wide-spread and fatal epidemic. At the very day of adjournment we found the excreta of typhoid fever patients being emptied in a common water closet, and believe that the seed had been sown for a prolific harvest of death. However sad the record, with all the facts in evidence before us, we rejoice that the scourge was not more intense in its virulence and more wide-spread in its desolation.

CLIMATIC OR WEATHER CONDITIONS.

The question occurs whether there were at this time, either in thermal or atmospheric conditions, any reason why the material of cesspools or sewers should thus become operative, or why soil or air or water should be unusually impregnated, or persons have an unusual predisposition to such influences here. It is fully recognized that conditions of temperature, moisture, and prevailing winds may determine the outbreak of an endemic or epidemic disease. These would be inoperative without the necessary materials to operate upon were present in the soil, in the atmosphere, in the food or drink, or in the person. On the other hand the material might be present in any one or all of these, but be restrained in operation because of the absence of the heat, moisture or other conditions necessary to development.

A record of the meteorology of the year from July 1st, 1879, to July 1st, 1880, and especially of the latter six months, shows some exciting causes well worthy of attention.

We refer our readers to our tables for this period as worthy of study on another page. The winter was an unusually open one, with much less frost and ice, and with a smaller amount of rain than usual. The average temperature of February, March, April and May was much higher than ordinary.

The deficiency of rain was such as almost to occasion a March drought. The accompanying graphic map presents the lines of temperature, humidity and rain-fall from January 31st to May 31st, 1880.

The failure of flushing the sewers of the college, which depended so much on sluice-water, has already been noticed, and no doubt contributed much to the filling up of pipes and the influx of sewer air.

It affected still more the wells which are the vertical drains for an area of which they form the center. If the ground about them is filth sodden, or abounds in organic matter, or if having combined with cesspools it is never so sure to pollute the water supply. The favorite and only and time-honored method of sewage disposal in Princeton Borough is by uncemented cesspools in the rear yard and often in the front yard, and sometimes in both, nicely covered over and sodded. They are expected mostly to take care of and empty themselves. That means that the ground soil shall so absorb the liquid and muck of the semi-liquid and fecal matter as to make the need of emptying the exception. This may do for a time where population is sparse and regulations enforced, or longer where the water supply is not derived from wells. But it is a most hazardous experiment when it is followed up in a compact town, and only awaits favoring warmth and weather to stir these multitudinous cauldrons into activity, and with a soil unusually and unseasonably dry and warm, the first natural diversion is the well. As this cannot afford full relief, the air undertakes to be a corrective and so becomes the common carrier of whatever effluvia may arise. Some parts of Princeton are kept with scrupulous care, and the objectionable conditions are flagrant only in one or two small sections, or in here and there two or three adjacent houses as they were in the two houses shown on our map. A dead animal in the well—three cesspools within seventy-five feet, tainted air from these and from the overflow in the house, and the previously favoring weather conditions seem to have precipitated the crisis. The condition of the college sewers and of some town localities favored the progress of the infection.

The college having been dismissed and this deportation as the first thing resorted to, it is proper to note some of the means advised to overcome the disease, and to insure against recurrence.

1st. The cesspools were emptied, cleaned and disinfected.

2nd. All the sinks and the water-closets, and the pipes which connected them with the cesspools have been removed from the buildings; and the pipes outside of the buildings have also been taken up.

3d. The rooms have been cleaned, and those in which sickness occurred have been disinfected.

4th. The use of cesspools has been given up and a temporary arrangement provided which will avoid liability to disease. A permanent system of sewage and slop disposal is in course of construction, which is in accord with the development of sanitary science. Mr. C. E. Philbrick, Civil Engineer, of Boston, Mass., has charge of the construction of the new system. The water-closets are located in a separate building and have no connection with the dormitories.

5th. Two large cisterns have been built to hold filtered rain-water, collected from pure sources, to be used as drinking water.

6th. The house where the disease originated has been thoroughly overhauled.

7th. It was recommended that students be prohibited from boarding at houses in a defective sanitary condition.

This latter was rendered necessary from the fact that very insanitary conditions were found on the premises of several boarding houses. The location of many wells and cesspools was such as to make it obviously unjustifiable to expose students to the possibility of such soil and water contamination. This was made the more obligatory from the fact that scattered cases of typhoid fever had occurred in the town during the vacation, and even when college assembled, although it had been put in so thorough a sanitary condition, the fact of existing cases in town made it necessary to protect the students from such possibilities. It was unfortunate that the Health Board of the borough did little during the summer, but we believe that it is more alive to exigencies which exist and which must be remedied upon a plan.

FUTURE WATER SUPPLY AND SEWER SYSTEM.

Either the uncemented cesspool system, or the wells must be abandoned in Princeton. It is hazardous to secure drinking water from the same soil in which these exist in near proximity;

with the soil and understructure of Princeton it is aboslutely unsafe.

The water-bearing strata of the borough is nearly the same in its most closely inhabited sections; it is reached through deep wells and rock, so hard as often to require blasting; the water as thus secured would be good if no surface matter could reach it, but the rock extends within a few feet of the ground surface; it is a hard shale arrayed in layers. This compact rock causes organic matter to remain near the surface, or if liquid or semi-liquid, as it must become through accumulation and by storm water, it forms into streams or little trickling rivulets along the surface of the rock. It is found that this rock is blocked off, or has frequent seams or joints, so that at points not suspected and sometimes quite distant from some series of cesspools, the foul substance can find exit and so reach wells, and mingle at the water bearing strata. These joints are much more frequent than in trap rocks. Here and there a well is thus known to be impure where there are no cesspools immediately adjacent. Such a condition as this demands either a constant watching and testing of almost each well used, or the prohibition of uncemented cesspools, or the use of cisterns, or the procurement of a water supply away from any possible household or populous complications. The risks are greater to the town than to the college, since the buildings of the latter need not be closely located, and its facilities for collecting and storing water from the buildings are greater.

In reference to all that relates to this outbreak of enteric fever at Princeton, it must only be said, that in its chief feature it is only a repetition of what has elsewhere occurred over and over again from similar causes and complications. There are many towns that just after this fashion are storing up material for just such sickly and deadly use in the future. By a want of co-action or co-ordination of conditions of water, soil and weather and susceptible live material, the evil day has thus far been postponed. Some have postponed the evil by securing a separate water supply. Although still polluting the ground, its results are, for a while, delayed by nature's conservatism, or by flight to the sea shore, or other methods of avoiding the continuous inhalation of polluted air, or when such air is inhaled, if it is common foulness and has not yet attained to specific contagion, it only causes

that general malaise and weariness and half force which devitalize and demoralize population, and so is now sapping vital power by insidious inroads, instead of decimating by virulent epidemics. There was no other way to convert New Orleans and Memphis to correct hygiene except to have yellow fever. It may be that our New Jersey cities, will continue to foster insanitary conditions until they too have some significant losses, or until there is a general reduction of the standard of good health, so pronounced, as to exhibit itself in the statistics of mortality. Still with the noble advance made in our own State in the last three years, and with an increase of intelligent popular sentiment and official power, we cannot but hope that many of our cities and townships will, more or less rapidly, put themselves upon a better health basis, and secure for themselves and for their homes, that blessing which, more than any other human gift, tends to life, liberty and the pursuit of happiness.

SANITARY INQUIRIES INTO ALMS-HOUSES AND JAILS.

BY WM. M. BAIRD, M. D., WASHINGTON, N. J.

With civilization we have the care of the criminal and dependent classes to engage our attention; and that they may be cared for at the least expense to tax-payers is an important consideration. But a higher and more important consideration is the giving of such care as will lessen the numbers of these classes in the future. Indeed, as a matter of economy to tax-payers, it is not so much what it will cost per diem to support these classes, as what measures shall be inaugurated to make the greater number of these dependents self-supporting, and to cause the largest proportion of the criminals to lead honest lives, that society will not be forced to protect itself by confining them.

The part that race, inheritance and various physical defects have to perform, I take it is the part of the subject our State Board of Health wishes to grapple with. That these, in various forms, have much to do with producing these social diseases is only too true. As directed by the Secretary of the Board, I made a visitation to several counties and only confirmed my previous opinion that many needed reforms were necessary before New Jersey would be up to the times in the care of her dependents and criminals. The majority of the people and, indeed, of officials appear to think that if they are well housed and fed that is all that is necessary; that to consider the subject in its higher relations is superfluous. The consequence is that a needless expense is entailed on the tax-payers of our State, and the prevention of pauperism or crime receives but little attention from the masses.

JAILS.

I visited the jails of Warren, Morris, Essex, Union and Somerset counties.

WARREN COUNTY.

Warren county jail is in the Court House, at Belvidere, the county seat. A recent Board of Freeholders remodeled the Court House and rebuilt the jail. It was originally built in 1825, and rebuilt in 1870; constructed of brick, it now consists of a new and old part. It is seldom that more than a few prisoners are confined in it. Cells are built so that the back walls of two cells abut each other. As soon as prisoners arrive, they are taken to a bath-tub and given a bath, and then assigned to their cells. The court surrounding the cells in the new part is quite well lighted, and natural ventilation has a fair opportunity to do what common sense failed to do. In the old part the court is not so well lighted or aired, but the height of ceiling, the cleanliness observed and few occupants, make the air supply very good during the day. The cells are ventilated by a hole opening in an air flue, common to the cell and the area back of it. I found no draught at the air holes on holding a lighted match to the opening. No arrangements are made for forcibly removing the air, and the ventilation of cells is sadly defective. The cells in all prisons visited by me are small and the arrangements for thorough change of air should be very complete. In this jail a frequent whitewashing does much to keep the air sweet; the excretions at night are received in tin pails with covers. In the jails are water-closets for use during the day. There is a privy in the out-yard. The water-supply is from the Delaware river, and is furnished by a water company supplying the town. A plentiful supply of water is had for cleansing purposes and for flushing pipes. Slop water and excreta are carried into a large cesspool in the back yard. This pool has no ventilation other than through the ground covering it. The jailor says there is *said to be* a cistern under the new jail. This, being confined and without ventilation, may be the means of not only breeding disease to certain criminals there confined, but to others whose province it is to mete out justice in the rooms above. The danger from this is not so great, however, in your reporter's opinion, as it is from the fact of having a good water-supply and very bad method for the disposal of sewage. The officials stated that they believed they had good traps. But when sewage is run into a cesspool tightly covered and there generates gases, and

when more sewage is run into the pool, this will either compress the gas or it will escape somewhere. Undoubtedly a great deal gets through the tank and passes off through the pores of the soil, but, unfortunately, the covering does not always permit it to pass off rapidly enough.

When pressure is brought to bear by this compressed gas in the trap, I fear the trap that will prevent its escaping in the apartments behind it has not yet been patented. The county is not so much to blame for this negligence as the town, for it is the town which will have to suffer in the future by its soil becoming thoroughly impregnated with sewerage matter.

DIETARY.

No regular dietary is had for each day, but the aim is to give the prisoners a change of diet. A physician is appointed by the Board of Freeholders, and is required to attend whenever called or when he deems it necessary; he is also required to furnish his own medicines without extra pay. The only labor imposed on inmates is caring for their apartments and cleaning up, whitewashing, &c. Tobacco is furnished to those who use it and the amount expended last year for this important article was $9.35. Alcoholics are not furnished. The people of the town occasionally hold services there on Sunday afternoons. A few papers are given them by officials and some sent in by friends or others. There is a hose to attach to water supply in case of fire. Lamps and kerosene oil are used for lighting.

No register is kept of inmates as to their habits, cause of dependence, mental condition, &c. The sick are treated in their cells, and nursed by other inmates, as there is no hospital. No witnesses have been detained the past year.

Prisoners are allowed to smoke and make ablutions in their cells. I remember, with pain, a visit I made to a prisoner, a couple of years since, who was confined for official malfeasance, and whose cell was ventilated so badly that the foul air from tobacco smoke and his own rebreathing made it impossible for me to endure it even for a few moments. He was suffering from palpitation of the heart and decided anemia, and gave a vivid description of symptoms plainly due to a vitiated atmosphere.

If prisoners are taken sick at night they have to knock and

call keepers. Prisoners are fed at a common table, and cells have iron bedsteads. Very little sickness occurs here. Outside the main jail, but in the building, is a cell containing, possibly, two thousand cubic feet of air space. I was informed it was customary, formerly, to confine tramps in this cell, and frequently they were packed in until they were crowded. This, without any means of ventilation except through a grated door, must have made it a veritable "Black Hole." The building is heated by steam.

MORRIS COUNTY JAIL.

This is situated in Morristown, and, as at Belvidere, is a part of the court house. It is built on soil of drift formation and constructed of brick and stone.

The walls are finished by plastering on the brick or stone; iron bedsteads are used. The cells open on an airy court, well lighted. So long as the jail is kept clean, a pure, natural ventilation is such that a sufficient change of air is had. The jail receives its water from the city pipes. As in the previous case, the sewerage system in vogue in Morristown, is by cess-pools. A large pool is situated just back of the jail and covered with plank and soil. The keeper has had considerable experience in prisons and understands the virtue of good house-keeping, and the general air of the jail was good. There is a water-closet in the back part of the jail, and he only allows the excretions of the body to go in this. Slops from bath tubs, &c., run in the gutters, and after emptying slops he flushes the gutters thoroughly with water, so as to cleanse them of all traces of slop-water.

The water-closet contains a trap but in spite of this foul gases are sometimes forced back through the trap into the jail. The keeper recognized the cause of this, and for this reason runs his slops in the gutter so as not to fill the cess-pool so rapidly, and thus force the gas to pass through the trap for an escape. If they will have cess-pools they should certainly run a pipe up to the top of the building as a ventilating pipe to it.

The health of the jail is reported excellent. The keeper says that the only sickness is from tramps and those brought there sick. In white-washing he insists on having the old scraped off and new put on.

Heating is by stoves. No regular dietary but a change is iven. Medicine is furnished by the county on physician's rescription. No system of employment for inmates except leaning up around; no tobacco furnished inmates. The risoners' moral and intellectual welfare is looked after by the Y. M. C. A. and ladies who supply them with pamphlets and apers. No provision is made in case of fire. Lighting is by amps. The sick are treated in their cells. Prisoners are allowed o smoke but not to wash in cells. There is no chance for change f air in cells but through doors, except in top tier of cells where here is hole 4x4 opening in attic.

One person was detained as witness during past year, but al- owed to go around the grounds. No record is kept as to their abits, cause of becoming criminals, &c. Excretions at night re received in chamber vessels.

SOMERSET COUNTY JAIL.

Court house and jail are situated in a large square in the town Somerville. They are constructed of brick and stone. They ave to accommodate a large number of prisoners. Water supply by well, for kitchen and drinking, and large tank at top of build- ig for flushing sewer pipes. Sewage is conveyed by means of rge pipes to a brook about a half mile from building. Sewer ipes are ventilated by pipes carried up to top of building. Vater closets, &c., have traps. Sewers have good fall. Slop ater is conveyed to a cesspool which leads to a gutter in the reet; this they aim to keep well disinfected. Building is heat- l by stoves. No light allowed in the jail. Oil is used in court ouse and sheriff's apartments. No regular dietary, but a iange is given as far as practicable. Medical attendance is ad when called on, and medicines are procured at drug store n physician's prescriptions. No employment for inmates. No bacco is furnished inmates. No witnesses have been detained ie past year. Excretions at night are received in ordinary hamber vessels. Prisoners are allowed to smoke and wash in ieir cells. Ventilation is only to be had by natural methods, o provision made for change of air. No record is kept as to abits, cause of becoming criminals, &c.

UNION COUNTY JAIL.

This is situated in Elizabeth city and is a part of the Court House. The building is of stone and brick. The jail for males is a large court yard with cells in the centre abutting each other. This is, I may say, the common plan for jail and prison construction in this State. There is a bath room and water-closet in corner of jail. Warden keeps this thoroughly cleaned with lime, and it had a clean appearance and good smell. The water-closet arrangements seemed of approved pattern and effective working. Excreta pass into city sewers. These are not ventilated between traps and sewers. There is also a water-closet in the kitchen. Water supply is by city water and is brought on all floors of the Court House. They also have a well which they have to use in very dry weather as the city water at such times gets to smelling. The building is heated by steam. There is a regular dietary for each day, and a change in diet is given. Prisoners are fed at a common table. The jail physician attends whenever called on, and medicine is procured at drug store on his prescription. They report very little sickness and nothing that appears to originate in bad sanitation of building. No tobacco is furnished except to a few who work, and they get a little smoking tobacco. Building is lighted by gas. In the male part the court is well lighted and natural ventilation has a fair chance and besides there are air flues in the walls of each cell. The female part is constructed on the same general principles, but is so surrounded by buildings that a change of air is not so easily brought about through windows and doors. The air of this part on this account had a close smell.

Witnesses are detained in a room up stairs, but as this entails solitary confinement, they sometimes prefer to be put in with the other prisoners where they have more company.

Buckets with covers are provided for cell use. Lime is kept in these all the time, and they looked clean and pure. Prisoners are not allowed to smoke or wash in cells. The sewerage on the male side empties in a cess-pool, and from this into the city sewer. This has to be occasionally emptied, and should be permanently closed or frequently cleansed.

ESSEX COUNTY JAIL.

This is situated in the city of Newark, and, of course, they have to provide for a greater number and a different type of criminals than in agricultural districts. Essex county has a penitentiary, and as soon as the courts sentence them they are removed to this institution.

The general plan for arrangement of cells is the same here as in other jails, but much more extensive. Prisoners on their arrival are taken to a bath-room and given a bath. Bath-rooms and water-closets are kept clean and carefully inspected daily by the officials. Prisoners are required to do the cleaning of the jail. Whitewashing is repeated at frequent intervals.

The excreta are run into the city sewer, and the closets and sewers are kept well flushed. Separate apartments are had for detention of witnesses and for hospital accommodation. Heating is done by steam. Water supply from city pipes. Ventilation of cells by the usual method of air-flue between two cells and opening from each cell into the air-flue.

The principal sickness is from the tramp class or from those brought in sick. The warden appreciates the necessity of keeping everything clean and using plenty of lime and water to accomplish this purpose.

ESSEX COUNTY PENITENTIARY.

This is situated between Montclair and Caldwell. It was constructed in 1873–4, and receives the prisoners from the jail after their sentence, instead of sending them to the State institution. It is built of stone and stands against a gently sloping hill. On the top of the hill is the reservoir for reception, storing and distribution of water. The prisoners on arrival are received in a bath-room, and given a bath, and their height, weight and appearance taken. Their clothing is done up in a package and marked so that they can have it when they leave the prison. A prison suit is given them of striped clothing; underclothing is given them every two weeks; shirt, socks and towel every week. Coats, pants and shoes are repaired when needing it. Each cell contains wash basin and water closet, with free water supply, for flushing pipes. Besides this there is a bath-room in the prison for the use of the prisoners. Sewerage is disposed of by the

Waring method, and the receiving cess-pools are a couple hundred yards from the building. The sewers are ventilated by pipes leading up to the top of the building.

Water is supplied by large well and by springs, pumped from them into distributing reservoir. They have plenty of water for all purposes, but during the recent dry weather, when the whole country was short or water, they were forced to be economical with theirs. The physician in charge says that at no time have they had, apparently, any sewage gases entering the cells, unless it was when the water supply was low. He thought that the lack of plenty of water made itself felt by a close smelling air in the cells. This is important as showing the importance of plenty of water with the best sewerage system. The sewage formerly ran into a main pipe and then emptied in a creek at some distance from the building.

The doctor states that he found organic matter in the water of the creek, some distance below where the sewage emptied into it. When that system was in vogue, though they had no low diseases, yet he found a lower vitality among prisoners, showing itself by opthalmia trouble, &c; this has disappeared since the present system has been inaugurated.

The building is heated by steam, and cells are ventilated by the usual method. There is a hospital for sick, with ventilation openings in the floor, but no openings at top of buildings. A regular diet list is had for each day and they aim to provide a change. Medical attendance is arranged for by daily visits from the appointed physician. Medicines are furnished by the county and drugs are kept on hand, and room is provided in the building for them.

Deaths last year were three in number; one dropsy, one heart disease, and one brought there with typhoid fever died in two days.

Prisoners are kept busy at quarrying and breaking stone. The warden informs me that they almost invariably gain weight. The building is new, and if our present system of caring for criminals is the proper one, it certainly comes as near being the model institution as it can well be made. We can easily see that they should gain weight. With wholesome food and plenty of exercise, they can hardly help but be in good physical condition.

No tobacco is furnished to prisoners. A library is provided for their use, and religious service is held on Sunday. No register is kept as to habits, cause of committing crime, etc. Plenty of sunlight can enter the halls, and of course shine in cells. Night watchmen parade the halls, and if prisoners are suddenly taken ill, they can call the watchman.

AIR SUPPLY AND VENTILATION OF THE VARIOUS JAILS.

The air space of cells ranges from four hundred to five hundred cubic feet of air space for each prisoner in the various prisons visited by me. This is increased by the doors being of grating, and by opening on large halls. Ventilation of cells, when provided for at all, is by flues between cells, and carried to top of building. In many of these a lighted taper failed to show any current of air. As these flues are always small, and as these buildings are usually heated with steam, a current of air could be easily provided by carrying a steam pipe into the flue, and thus providing for a current of warm air continually.

Examination of air was had in nearly all institutions. The lime water test showed no impurities, but I have tested in cells that had a foul smell, and yet found no change, indicating that there are other impurities of the air than respiration.

CAUSE OF CRIME.

Any statistics that I was able to gather, concerning this important subject, were necessarily imperfect this year. No inquiry is made by officials into this, when prisoners are received by them. All keepers agreed, however, that intemperance is, of all things, the most fruitful cause of crimes. This is not strange, when we think of its well-known power of lowering the moral sentiments, and elevating the passions unduly. Undoubtedly the majority of these persons are born with selfish propensities over developed, and with limited ideas of their moral responsibility. This is not improved by their education. In the opinion of the writer, inheritance and intemperance should be considered together, for these persons are, as it were, on a pivot, liable to go either way. If they observe temperate habits, are steady and frugal, they will pass through the world as honest men and women; but if their education has been such as will

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develop the passions, and create habits of intemperance, they will take the other side, and become criminals. They are evenly balanced when sober, but when stimulated with alcoholics, their moral sensibilities are loosened, and they easily slide over to wrong-doing, and thus commit many crimes against society.

In this manner alcoholics act as the exciting cause. The fact that they inherit low ideas of their moral responsibilities is the deeper cause. Thus alcoholics become the exciting cause of from seventy to eighty per cent. of all crime committed. I do not think this is putting it too high. One warden said that ninety per cent. of the criminals was made, so he felt sure, by alcoholics; he made this estimate after years of experience with this class. His experience here had been mainly with short commitments, such as occur in county jails, but he had been a keeper in a penitentiary and thought that this same percentage would apply there.

The deputy warden of the Essex County Penitentiary, who has been connected with that institution since it was built, and, prior to that, with the penitentiary on Blackwell's Island, N. Y., put the percentage much lower, but thinks alcohol is a fruitful source of crime. But this evident cause of criminals is worthy of the closest study by statesmen and legislators.

As to inheritance, though many criminals are such from birth, following the same line of criminality that their parents did, yet the masses of criminals, we doubt not, are recruited from the lower social classes.

Children born in tenement houses and educated in the gutters will have little inherited idea of right or wrong, and their education will drive out what little moral sensibility there is remaining. What can we expect but that these children will become criminals and dependents?

The writer could find but few facts regarding race. Intemperance, inheritance and education are the main factors to be considered in reference to diminishing the criminal classes. Regarding the latter, I do not think that mere intellectual education is all that is necessary by any means.

Unfortunately, society has not yet reached the point at which it is agreed as to the proper manner of cultivating the moral qualities, but it is just as much the duty of the State to do this

as it is to educate the intellect, and to do it for self-preservation. At the same time their physical nature should be looked after.

The work of the State Board of Health here makes itself felt. The better instruction of the people in sanitary laws, and self-care will, I doubt not, be shown in a few years in lessening the proportion of the criminal classes. The proper education of the child is to give it an "all round "education. While we are looking after its intellectual and moral education, its physical should be looked after as well.

Therefore, it is the duty of the State to provide for the education of its children into the laws of their physical being. After the care of self and after reading and writing, the first thing taught should be physiology and hygiene. This may seem sentimental and ahead of the times, but that it would lessen criminals, I feel sure.

In the prisons visited by me I think I always saw evidence, on the part of the officials, of diligent effort to keep their charges in good sanitary condition. There might be some improvements made in all the prisons visited, in some sanitary details, and in the construction of buildings; but in all there was good housekeeping, and the absence of disease spoke well for their sanitary condition. The officials of the Essex County Penitentiary should be commended for their prompt change in sewage disposal, when they found that the original plan was inefficient. Unfortunately committees and other governing boards are not always so prompt in making needed changes, for fear of losing votes at the ensuing election.

If the present plan of confinement and punishment is the proper method for caring for criminals, then I have but few suggestions to make. A plentiful supply of water and lime and good food will make up for many deficiencies of modern sanitary appliances. Of course such a condition of sewage pipes as exists at the Warren and Morris county jails should be at once remedied (where sewage passes into tight cesspools and these as well as pipes not ventilated) but this is the fault of jail committees and not of the jailers. It may be that all of our care of criminals is defective. While it cares for them and punishes them, yet it might be well to inaugurate a method having more reference to the cure of their social condition and the prevention

of crime in the future. That this will be the method of the future we do not doubt. The education of the youth properly belongs to the public instructor, but after they leave his care, it might be well to have some system of visitation that would look after young persons who are committed for the first time for some light offense, as drunkenness, vagrancy, assault and battery and petty thieving.

The plan I suggest would also look after the discharged prisoners, seek for them employment and help to make them respectable citizens and to forget their past life so far as possible. The medical profession is recognizing the great importance of preventing disease in order to prevent crime, and are studying side by side these great social problems, which have for their aim the physical, moral and industrial elevation of the masses.

ALMS-HOUSES.

In country districts these buildings are often situated some distance from towns, and are, therefore, not subject to the frequent inspections that jails receive. Among many officials there seems to be almost an opinion that anything is good enough for the pauper. This is not true, according to my experience, of the official having direct charge of those people, but it is true of the governing boards in many instances. The sanitary condition of alms-houses will not compare at all favorably with the jails. The latter are far better constructed and better provided with sanitary appliances than the poor-houses.

WARREN COUNTY POOR-HOUSE.

This is situated on the road leading from Hackettstown and Port Murray to Belvidere. There is a large farm, which is worked by pauper labor principally. The building is old, having been built many years ago. Some one hundred feet from the main building there is a two-story building of more recent construction, which serves as dormitory for some of the men.

The inmates in the summer get reduced to less than ninety. In the winter they are added to until over one hundred and

twenty have to be accommodated. It will accommodate eighty or ninety inmates quite comfortably, but as built and arranged it is not adapted to hold over seventy-five. In a letter to the Washington *Star*, of January 23d, 1880, I made a detailed report on the sanitary condition of the house. At that time there was one hundred and thirteen inmates. This made less than three hundred cubic feet of air space for each inmate. No provision is made for ventilating rooms other than by valves over the doors. These are sadly insufficient for the purpose. In addition to its overcrowded condition, the building is heated by stoves, and not only is the air consumed by the inmates, but by the stoves. These are cared for by inmates, and the amount of coal gas thrown out generally by each of the stoves is fearful to contemplate. I give the dimensions of one room, on the men's side, of the foul condition of which I have a vivid remembrance:

It is room No. 2 containing nineteen hundred and seventy-five cubic feet of air space. One stove, two windows, one door, six inmates, three hundred and twenty-nine cubic feet air space per inmate. Very close. Nine thousand and fifty-four (9054) respiratory impurity per one thousand volumes. This room is invariably foul. It is used during the day as a sitting room and smoking room, and usually in cold weather there are ten or twelve sitting in it, making less than two hundred cubic feet of air space per inmate during the day. There are here a couple of old men chiefly confined in their beds. I have noted the fact that these inmates complain more during cold weather than during warm, when they can be out. The stove here gives off great quantities of carbonic oxide, which decidedly helps to make the room unbearable to those used to pure air."

I was the attending physician for two years. In the winter time, when doors and windows were closed, I could not stand it in this room at all; it could only be appreciated on being inhaled. The truth is that the ventilation of the whole building is as bad as it well can be, and in the winter months it is much overcrowded. The mortality to children was great during my attendance. In case of sickness in adults or children, the vitality would be so much lowered, and this, combined with foul air, made it almost impossible to rally them. The Steward was par-

ticular in keeping the house well cleansed and whitewashed, and this, I believe, prevents an outbreak of septic disease.

The water-supply is by a spring, about seventy-five or one hundred feet north of main building this is lower than basement of building a few feet further on, and on six or eight feet higher ground, is situated the privy. On first glance, this would seem criminally close and in just the position to contaminate the spring; practically, however, this seems never to have occurred, and the lay of the ground would seem to carry all drainage in a direction from the spring. Recently, the authorities have brought the water from the spring down into the house, and it is hoped they will soon distribute it through the house.

The present management have arranged the privy so as to remove its contents and spread on the soil every few weeks or months. Still the chances for contamination of spring remain, for it is difficult to tell how many crevices may be in the rock and what direction they may take. This privy vault may have contaminated the soil for many feet around. A large spring against the hill, a quarter of a mile from the house, could be easily conveyed to and through the house.

Slop-water from the kitchen is thrown into drains in front of each kitchen door. The soil is of gravel drift, and the drain leads some distance down the hill and empties itself into the soil. This provides quite efficient disposal of kitchen waste by irrigation. Excreta is emptied in a privy vault, from which it is spread on fields. Ordinary chamber vessels are in use for the night time and for the sick. The need of more space, better ventilation and more water-supply is sadly felt.

The children are sent to school at the public school about a mile distant. Places are found for them as fast as possible. The arrangement of the building and its overcrowded condition make it impossible to separate the sexes entirely. Every effort possible is made to keep them apart, but they succeed in getting together at times. I clip from my letter in the *Star* the following, which tells its own story:

DEATHS.

Deaths from June, 1878, to January, 1880	16
Those having one or both parents paupers	6
Percentage of those dying having pauper parents	37.5

BIRTHS.

er of births from June 1, 1878, to January 1, 1880..	6
" conceived in the house....................	3
ese conceptions took place prior to present management.)	
ıtage of births that were conceived in the house......	50
ıtage with Irish parents....................................	66.6
ıtage of illegitimate..	16.66
e small number makes the above of but little practical)	

STATISTICS OF WHOLE NUMBER IN THE HOUSE.

esent in the house..	113
ived and born there..	8
here..	16
ıg pauper parents, one or both..........................	32
;n born—Ireland, 25; Scotland, 2; England, 2; Ger- ıy, 5..	34
e born..	79
ıtage of inmates conceived and born in the house...	7.07
ıtage of inmates born there...............................	14.15
ıtage having pauper parents, one or both.............	28.31
ıtage foreign born..	30.08
ıtage native born	69.91

STATISTICS OF ADULTS IN THE HOUSE.

s in the house..	84
s conceived and born there...............................	2
addition to this there are a number of doubtful cases.)	
s having pauper parents, one or both....................	6
. the foreign born deny it, as a matter of course.)	
ıtage conceived and born there...........................	2.38
ıtage having pauper parents..........	7.14
ıtage to whole number in the house....................	74.33

STATISTICS OF CHILDREN IN THE HOUSE.

›er of children in the house...............................	29
›er of children born there..................................	14
›er of children having pauper parents, one or both,	26
›er whose parents are both there now...................	11

Number of children conceived there	6
Number of children of illegitimate birth	12
Percentage of children to whole number of inmates	25.66
Percentage of children conceived there	20.68
Percentage of children born	48.27
Percentage of children that had pauper parents, one or both	89.65
Percentage of children that are illegitimate	41.37

MORRIS COUNTY POOR-HOUSE.

This is situated two or three miles from Boonton, and the county owns there a farm of two hundred and forty acres. Building is of wood, and the main part is old, and though in good condition outwardly, the walls and floors are poor.

There is a new building, perhaps seventy-five feet from the main building, and this serves as a dormitory for men. There is provided from five hundred to six hundred cubic feet of air space per inmate; no arrangements are made for change of air other than by openings over doors and through windows and holes in ceiling opening in attic. The air of the new part seemed pure, but in the old or main building it was close and had a bad smell. Air, however, on my visit showed no excess of carbonic acid gas. Rooms are frequently and thoroughly whitewashed, but in spite of this the general air is bad, indicating that a thorough remodelling of the building is necessary. Kitchen slops empty in pipes leading to a creek, possibly two hundred feet distant. Privies, with vaults under them, receive the excreta; these are emptied every few months. No indoor water-closets are provided; chamber vessels are used for night use. There are a couple of closets in the house in which buckets are kept for use of inmates, and these they are required to remove daily and cleanse.

The old building had originally vaults under one side of it so that each room on one floor of that wing had a privy adjoining it. This became so great a nuisance that these vaults were filled in some years ago and the lids of the privy holes screwed down. Water is supplied from four wells; in the wash-room of the new building water is led in by pipe from a reservoir.

Iron bedsteads are used. A portable bath-tub is in use for inmates. They are fed at a common table. Cellars are under

nearly the whole building. Some difficulty has been experienced in keeping meat in one of the cellars. Water does not come in the cellars and they were clean and well aired.

Three ward-rooms have fire places. Heating is done by steam. No regular diet list is had, but a change is provided. There are five insane paupers and eleven demented or foolish. All are considered harmless, and they are not kept separate, but the Steward thinks they should be. Male and female are locked in separate apartments at night, but mingle freely together during the day. Steward believes this should be different, and that they should be kept separate at all times; but he could not well do this in the present building. With the exception of having more space, this institution is not near so well arranged as the Warren County Poor-house.

The children are taught by a pauper in the building, and they are bound out as soon as places can be had. The attending physician states that they have had "no diseases for many years directly traceable to sanitary defects."

Inmates are required to work on farm and garden when able. Tobacco is furnished to about thirty. Kerosene lamps are used for lighting. No register is kept as to habits, cause of dependence, mental condition, &c.

ELIZABETH CITY POOR-HOUSE.

This is situated on the border of the salt meadows, just out of Elizabeth city limits. It is built of stone and brick walls are hard finished.

Most of the children are vaccinated, but it is not seen that they are vaccinated when they are brought in. Iron bedsteads are in use. Bath-rooms are provided for inmates. Sewage runs in pipes and empties about two hundred feet from building, on the salt meadows. Buckets are in use in case of sickness.

Privies are in use out of doors, and excreta drops in vaults. These are cleaned every winter, but not ventilated. Water-supply is by well and cistern. Heating is by steam.

The average number last year was forty. There are three insane paupers. An inmate's arm was broken a couple of years since, by an insane pauper. As far as possible, the sexes are kept separate. Medicines are kept in the house, and a phy-

sician visits them every two days. Tobacco is furnished to those that use it.

No arrangements are made for schooling children. As soon as old enough they are put in the various asylums. Kerosene oil is used for lighting. No register is kept as to habits, course of dependence, &c. Over one-half are foreign born.

Heating is by hot-air furnaces, and ventilation is through windows and doors. The house, at time of my visit, was certainly not crowded, and air of apartments was pure, so far as sense of smell was concerned.

Paupers are required to work on the farm and garden when able. The institution is reported healthy.

ESSEX COUNTY POOR-HOUSES.—NEWARK CITY ALMS-HOUSE.

This is situated on the Elizabeth avenue and adjoining the salt meadows, and at extreme end of city. Buildings are owned by city, and are built on sand and gravel drift. City has here about thirteen acres of ground, which are used for most part for trucking. Building is constructed of brick; originally erected about 1840, and rebuilt and enlarged 1868. All children are vaccinated. Iron bedsteads are in use.

Inmates, on their arrival, are given a bath, and their clothing is boiled and pickled in alum and hot water to destroy the vermin. The steward says that he had great trouble to keep vermin out for a while, but they stopped the rolling up of old clothes and putting them under the pillows, a custom very common with this class; since that time, by observing strict cleanliness, there has been little trouble with vermin. Every inmate is required to take one bath every week. Inmates are fed at common table.

All sewage runs in city sewers; all openings are well trapped. There was formerly a large vault under the centre of the building, and water-closets over it. There was a well about sixty feet from vault, and a gradual slope from vault to well. The present management had this vault carefully cleaned and filled in with dry earth. This was five years ago, and at that time the well-water had bad taste and there was a smell from privies through the house. Then was inaugurated the system of sewerage now used, which remedied the evil. The Steward and Governing Board has aimed to have all sewer openings well trapped. Sew-

ers are ventilated only by openings where surface water runs in, and are ventilated also by tin pipes carrying roof washings in the sewer.

The average number the past five years (since present management came in) has been about the same.

Death rate in 1875 was at the rate of 78 per thousand.

Death rate in 1876 was at the rate of 54 per thousand.

(This was after vault was cleaned and sewer put in.)

Death rate in 1877 was at the rate of 48 per thousand.

Death rate in 1878 was at the rate cf 28 per thousand.

Death rate in 1879 was at the rate of 23 per thousand.

The Steward attributes this (and I think correctly) to the improved sanitary condition of the house. During this term the yearly average was about two hundred. This being the case, we find a reduction in the death rate of the house from thirty-nine per cent. to eleven and five-tenths per cent. Certainly this reduction is worthy the study of some poor-house officials, who think sanitary authorities are visionary when advocating improved sanitary measures. I think the above figures tell their own story, and that the moral is plain. Ventilation is by fanlights over doors, and halls have ventilating opening through ceiling, and ventilators on roof. At my visit I found the air of rooms good, and they were not in a crowded condition.

The water-supply is from city water-works; there is a receiving cistern in the attic. There is also a well which is used some for cooking purposes. The city water can be used by using from storing tank in the attic or directly from city main. Steam is used for heating purposes.

A change of diet is provided and fish is given on Fridays. A number of harmless imbeciles are kept here, and the Superintendent thinks it not essential to keep them separate.

Sexes are kept in separate apartments, and while out of doors a high board fence separates them. Nursing of the sick is by inmates. Medical attendance four or five times weekly, and oftener if necessary. Medicines are furnished by the city on requisition of alms-house physician. Officials complain that the alms-house is made the receptacle of nearly all the incurable poor from their hospitals.

The need of Newark seems to be a city hospital for the poor. No hospital is provided in alms-house, but a room is provided

as lying-in room for women. Inmates are required to work on the farm, trucking, &c. A few have tobacco furnished them. Children are sent to public school near by, and they are apprenticed out when places can be had. About twenty were born in the house last year.

Oil is used for lighting purposes. No register is kept as to habits, cause of dependence, mental condition, &c. Although there are many errors in construction of building, &c., yet this institution is, in its general condition, far superior to the average poor-house.

Franklin township, Essex county, supports its poor at the Belleville poor-house, but the greater portion of its poor is given out-door relief by its Overseer of the Poor. They have but one in Belleville poor-house, for which they pay two dollars per week. Overseer said he had about thirty to whom he was giving relief. Of twenty out of these thirty, the cause of their dependence was either directly or indirectly to be found in alcoholic drink.

Belleville township has a poor-house. Overseer of Poor has control of it, and lives about one-quarter of a mile from it. It had seven inmates on my visit, and the overseer furnishes food and fuel and other necessaries, and they keep boarding-house for themselves. The overseer has been the same for very many years. Says house has usually been healthy since the typhoid fever prevailed, twenty years ago. Most of sickness is brought there. Children are bound out as soon as proper homes can be found. Of the seven in the house, four were Irish born, two American and one English. The overseer thinks debauchery and dissipation the most frequent cause of pauperism, and says he estimates eighty per cent. of paupers are made so by drink.

Bloomfield township has an alms-house, but they aim to help, by out-door relief, as far as possible. At my visit the house was closed and I did not inspect it.

Montclair gives out-door relief, and has poor-house which has an average of ten inmates. It is under the control of the Overseer of the Poor. The building is on a lot, or small farm, and is like many cheap farm-houses; everything about the house was neat and clean, and while here, I felt strengthened in my belief that to scatter the poor, and each township to care for its own in

small buildings, is, after all, the better way for agricultural districts.

Inmates here are not allowed to leave the premises. The overseer thinks this works well, as they do not like the confinement and are apt to seek work.

They have a room set apart for the sick, and this contains an earth commode. There is an out-house for lodging tramps where they are put without pipe, tobacco or matches, and they are given but little to eat.

GENERAL REMARKS.

To my question asked Superintendents and Overseer, "What do you consider the most fruitful cause of pauperism?" the reply *always* came without hesitation, "Drink." This was estimated as the cause of from sixty per cent. to seventy per cent. of pauperism. Taking the opinion of all the men having charge of alms-houses, jails, and out-door relief and with whom I came in contact, I am safe in saying that at least eighty per cent. of crime and pauperism, is due to alcohol. The Steward of the poor-house, at Elizabeth, gave me a case to the point: A man with wife and four or five children, a workman in Singer's Sewing Machine Manufactory, able to earn thirty dollars per week, became so dissipated that at last himself and family became inmates of the poor-house. Although not a member of any teetotal organization we are forced to admit that *alcohol is the cause of by far the greater proportion of crime and pauperism.* It has a more direct relation with pauperism, than with crime. In men of bright intellects, alcoholics elevate the passions and debase the moral sentiments, and crime is the result. In the lower ranks and among men of low intellects, though it has the same action, yet they do not become criminals, but all shame and sense of degradation is lost in the desire for drink, and they become paupers. The aim of alms-houses seem to be to give a home to the unfortunates who are forced by reverses to become dependent on charity.

In reality, they are the home for the low debauched. Race becomes more prominent when we consider pauperism than in considering criminals. Inheritance undoubtedly plays an important part in the production of pauperism. A year ago, in the Warren County Poor-house, I found over twenty-eight per cent.

had pauper parents. (See figures above.) I believe the proportion will fairly hold out over the State. Venereal diseases have been quoted as a cause of pauperism, but I am inclined to consider them the result rather than the cause of pauperism.

So far as my inspection is a criterion then, it shows that the system for indoor relief in this State is to care for those becoming dependent, and has no reference to present or future prevention. This seems a vital error. Full statistics should be kept so that accurate knowledge could be had as to habits, cause of dependence and mental condition. As to sanitary condition, without doubt, they are, upon the whole, bad. The only reason that septic diseases are so few, is, no doubt, due to the cleanliness and strict oversight of the Superintendent.

In the city of Newark, the Overseers of the Poor have full charge of out-door relief; they make visits and inquiries before extending relief, give coal, bread tickets, and a little cash. Overseer thinks this much better than orders on groceries and market. The careful oversight of Overseer seems to have materially lessened cost of out-door relief. Economical out-door relief, with some provisions for in-door relief, seems to be in accordance with the most enlightened views on the subject of pauper relief. The buildings for reception of paupers in counties visited by me, are arranged with little reference to the needs of such institutions. The writer favors the cottage or pavilion plan, but the model poor-house is not in these counties.

A question of vital interest is the tramp question. I was agreeably surprised to find a unanimous opinion among officials that something should be done to lessen the amount of crime and pauperism. The matter is worthy of the closest scrutiny by legislators.

With carefully-collected statistics, and with popular opinion aroused, this State could revise its poor laws, and in other ways do much to not only better the condition of the paupers and criminals, but what is far more important just now, do a great deal to lessen these social disabilities. In some of the public institutions improvements could be readily and economically made in sanitary measures, but for the most part the governing boards of these institutions are little acquainted with sanitary laws, and these are made secondary to other considerations.

The many thousands spent for poor relief in this State, should

be lessened in some way. A very large proportion of our pauper population is of foreign birth. Some measures taken by our National Government to limit this class of emigration would no doubt benefit the tax-payer.

The measures taken to diminish crime and pauperism go together. The care of insane paupers by the counties themselves, instead of caring for them at the State institutions, is at tracting considerable attention. I frequently had the lessened cost to Essex county quoted to me and visited the Insane Asylum at Newark. If other counties will provide equally good accommodations and supervision, I should advocate the scattering of our pauper insane, but to take them from the comforts of a well-regulated State Asylum to some of our poor-houses would be actual cruelty. Many forget that the needs of Essex county, with a large city and its populous suburbs, are different than the needs of an agricultural county like Morris and Warren.

What has already been said regarding education, when treating of the criminal classes, will apply as well to to the pauper classes. Though our overcrowded poor-houses should be relieved, and many changes made in their sanitary arrangement, as well as in that of the jails, yet I feel assured, the really important thing for public spirited citizens of our State to consider, is more enlightened methods for the care of these classes that their numbers may be diminished, and that those once discharged may not again become criminals or paupers.

In conclusion, I should like to express my thanks to all the officials with whom I have met. I was treated with uniform kindness, and not only allowed to make inspection, but had extended to me valuable assistance in many of them, while closely following existing methods, yet express themselves defective. If, at any time, it should be deemed advisable to gather more accurate statistics regarding this vital subject, none will more heartily concur than these officials, many of whom will be able to give valuable hints.

The jail of Middlesex county was examined by the Secretary of the Board and found in good condition, with a few minor exceptions.

The description of Warren county Alms-house well applies to that of Camden county, which will be noticed in the next report.

LOCAL HEALTH BOARDS.

WHAT THEY CAN ACCOMPLISH IN THE INTEREST OF PUBLIC AND PRIVATE HYGIENE AND SANITATION.

BY H. A. HOPPER, M. D., HACKENSACK.

If the diffusion of knowledge pertaining to private, and through it to public health, be the lever by which communities can be moved in the direction necessary to secure their present and prospective comfort, it becomes plain that the domain of the local health board is not alone the correction of existing evils, but the use of all legitimate means within reach to inculcate the the truth that *preventable* diseases cause a large share of the discomforts and sufferings of the human race. As sanitary science progresses and opens up new fields for investigation year after year, new demands are continually being made for the development and utilization of the best methods to be employed, in the application of newly discovered scientific laws, to the daily requirements of domestic and public life. Health Boards are at present the recognized instruments for the emergencies of the situation.

It may be safely said, what the unit is with its fellow in the statement and solution of a mathematical problem, so also is the relation of a properly organized Local Board of Health to the value and efficiency of both State and National Boards, in the collection of data for the intelligent and satisfactory enforcement of all sanitary regulations within their jurisdiction. It is a self-evident proposition, that all circumscribed areas of human habitations have their especial wants, which are best understood by the intelligent observer, whose constant association with a particular population and their habits of social and domestic life, and whose knowledge of topographical and prevalent meteorolog-

ical influences enables him to estimate the especial needs in such localities. Special commissions of investigation must frequently fail of accomplishing the object of their creation, where either ignorance or indifference and often the opposition of prejudice withhold needed information, or interpose obstructions to the pleasant working of public machinery. The value and importance of a Local Health Board cannot be over-estimated if the true spirit and object of its work be appreciated, both in relation to home improvements and the collection and summarizing of correct data for the annual report of the State Board. To render such service in keeping with its importance, the Local Board must at its earliest opportunity, push forward the work of making a sanitary map, by actual survey of the territory within its jurisdiction, defining the topography, including sub-soil advantages for draining, together with notations of changes which have been made, or which should be made, by the filling in and obliteration of water-courses, suggestive of the requirements not yet met, and in all matters to study and define the specific demands of such locality, growing out of the sanitary relations of the population to the soil covered, and to be covered, by their habitations. Social and domestic habits can be pretty effectually learned without intruding, offensively, upon individual rights. Exposures of unsanitary conditions connected with the dwelling are so frequently spontaneous, that they make their own suggestions. A surface house drain reveals itself by projecting its waste beyond the house enclosure, and by its offensiveness calls for the attention of the Health Board. The neglected cesspool and privy vault regale the nostrils, and cry out for relief. Many other tacit exposures of domestic indifference and carelessness, attest the value of corrective supervision. The duty and work of the Local Health Board appears plainly to be first to learn the necessities of the population which dwells within its jurisdiction, and then to devise the most prudent, as well as the best means to meet such necessities; but in the exercise of authority, to make it successful, rather by the force of sanitary education, than by the exhibition of imperious power; always tempering the corrective with something of the "*argumentum ad hominum*," persuading by appeals to selfish impulses, if need be, including the argument for the protection of self and home, that private interests may be made subservient to the public weal.

When recourse must be had to legislative power, in the event of other failures, let the broadest construction and application be made without reserve.

The foregoing treatment of the subject is rather a generalization of its importance than a detail of the practical work which it suggests. For example, the importance of a private system of drainage for every home must be insisted on, and when hesitancy or delay retards the necessary improvements, the local board must point out the necessity and establish a system applicable to individual cases, without regard to special locality. The danger of allowing garbage or wash waste from houses to be thrown carelessly on the surface, or to be conducted into a badly-constructed cesspool, must be met by instruction, or by ordinance compelling the abandonment of the one and the construction of both cesspools and privy vaults with water-tight bottoms and side walls, to avert the danger of well-water pollution; and so to apply a system of pipe ventilation that atmospheric poisoning may be prevented inside of dwellings.

Another subject imperatively within the province of the local board, is the important one of particular supervision of public buildings, both as it relates to the method of conducting sewage matter from such buildings, the mode of heating, and the application of the best-known methods of ventilation to all the apartments of those structures.

In this category must be placed court rooms and jails, when they are within the limits of control of the board. Hotels for the accommodation of boarders, churches and public assembly rooms of any kind, and notably school buildings, which are not to be passed over with an inspection as to general plan, but should include the detail of examining class-rooms, in relation to ventilation, as it may be applied to the requirements of an average number of pupils occupying such rooms during school hours. From the local board should emanate suggestions to principal and teachers for the detection and stamping out of contagious and infectious diseases when they make their appearance in the school. Where vaccination has been neglected, no better opportunity for the discovery can be found than by the roll-call from the teacher's desk. The application of our State laws, as provided for in such cases, becomes a comparatively easy matter by such supervision.

Verbal advice, judiciously given by an authorized committee from the local Board, will accomplish great things by challenging attention to the constant neglect of the plainest, as well as the most intricate laws of public and private health, but in addition to this, recourse should be had to the local press whenever the columns of a newspaper can be employed, to reach a larger number by the discussion of subjects pertaining to the sanitary needs of your people. At stated periods printed circulars should be distributed, containing health ordinances for the guidance of all concerned in the promotion of the best sanitary interests of the community, both general and special.

Appended is a specimen of the plan, indicated in the above consideration, which has been found to work admirably under the direction of the Board of Health of New Barbadoes township, especially in its application to the town of Hackensack, N. J., where, in the period of six months, neighbors who were for a long period of years indifferent to each other's surroundings, have become vigilant advisers for their mutual benefit.

CIRCULAR OF THE BOARD OF HEALTH OF NEW BARBADOES TOWNSHIP.

At the last session of our Legislature, particular attention was given to the pressing wants of the people of the State, looking forward to a more perfect system of sanitation for both town and country. Laws were enacted for the compulsory organization of a Board of Health in every township in the State.

Under the provisions of the laws alluded to the township of New Barbadoes has organized our Board of Health, and we now appeal to the people of the township for your co-operation in carrying forward a work which is in every way calculated to secure a better and more permanent condition of the public health.

At the outset we are thoroughly impressed with the importance of the truth that a proper education of our people in sanitary matters lies at the foundation of a successful enforcement of that system of individual restraints which is the great factor in making up the sum of community profits from a well-regulated public hygiene.

So many sources of atmospheric and water pollution exist in every community unheeded, that familiarity with their presence begets an indifference to the fact that, every week and month of the year, such sources of danger to health and life are multiplying; and unhappily the force of this truth is often realized only when some devastating pestilence numbers its victims by dozens, and sends distress and mourning into as many households.

As the preventive is always more satisfactory than the remedy, we desire to call your attention to some of the more common and unsuspected causes of bad health, and advise their immediate removal by individual effort, in order that the powers conferred by law may not be required for coercion by the Board of Health:

Outside of dwellings, badly constructed and much neglected cesspools and privy vaults pour out the poisonous gases of organic decomposition to vitiate the atmosphere you breathe in your houses, while through their uncemented bottoms streams of corruption percolate the soil and find the outlet for their polluting matter—held in solution or suspension—in wells which supply families with water for drinking and cooking.

As the season is advancing and summer will soon follow spring with increasing high temperature, when putrefactive decomposition of waste matter is certain to be rapidly increased, it is the part of wisdom to begin at once our efforts for the removal from our houses of every source of such contamination.

We call your attention to some advice given by our State Board of Health in the following paragraph:

"Look to the condition of your house. Begin at the cellar or basement. Have nothing there that can decay or that causes foul odors. If damp, let in air or sunlight; or drain the surroundings if needed. If by cleansing by whitewash, or by repeated airing, there is not agreeable air, speedily use some disinfectants. Look to the kitchen; let all sinks be kept sweet by scrubbing, by hot water poured down every day or by the free use of disinfectants when needed."

Be sure that the sink is properly trapped and that a ventilating pipe is carried from the waste pipe of the same size, to the top of the building and above it.

Have the dwelling and sleeping rooms well aired every day; shake up the bed clothes freely every morning after sleeping in

them, and air them well by windows widely opened so that free ingress may be given to outside air, in order that organic particles, which would otherwise accumulate and cause atmospheric pollution, may be neutralized and driven out.

In your attention to the out-door arrangement of your home—see to it, first, that the privy vault and cesspool are not in too close proximity to your own or your neighbor's dwelling; second, that it is constructed with masonry, water-tight in both side walls and bottom; that filth accumulations may be thoroughly removed at stated periods—and pollution from such sources of your own and your neighbor's water-supply may be prevented.

Both of the filth receptacles just named should be supplied with ventilation high enough to avoid throwing offensive gases into your own or your neighbor's windows.

In all cases where new vaults are built, the old one must be thoroughly cleaned before being filled with earth. All these conditions will be strictly enforced in the future.

To avoid future complaints to, and attention from the Board of Health, it is suggested that immediately after the present cleansing, tight bottoms be made to all filth receptacles.

Any suggestions needed for sanitary management will be freely given by the Advisory Committee of the Board of Health. H. A. Hopper, A. S. D. Demarest, M. W. Heath.

A list of the best and cheapest disinfectants may be had at any time from the same source.

H. A. HOPPER, M. D.,
President and Medical Superintendent;
M. W. HEATH, *Vice President;*
H. H. ZABRISKIE, *Secretary;*
A. S. D. DEMAREST, *Treasurer;*
JOHN SCHMULTS,
Board of Health of New Barbadoes Township.

SECRETARY'S SUMMARY OF REPORTS

FROM LOCAL BOARDS OF HEALTH, WITH COMMENTS.

One hundred and eighty-seven formal reports have thus far been received by the State Board from local boards.

Twenty-six more report boards as formed, but they have had occasion to do so little that no special report was rendered. A few townships, understanding the law to be permissive and not compulsory, have failed to organize. It is believed that another year will witness the formation of boards in all townships and towns of the State. While in some there will be need of very little service, it is the right of every citizen to have thus a constituted authority to which to appeal in case of need. Besides the existence of such a board leads its members, as well as others, to be more inquisitive as to matters which concern the public health. This is sure to result in greater intelligence as to the avoidable causes of disease. No one could read the reports received, and some of them from very sparse districts, without recognizing that the subjects of inquiry are many, and that needs may arise for oversight in localities which seemed protected.

The form of schedule sent out was as follows:

ANNUAL REPORT

Of the Local Board of Health of (city or township)................. county of.....................................for the year ending October 1st, 188

NAMES AND POST OFFICE ADDRESS OF MEMBERS.

....

....

SCHEDULE OF SUBJECTS FOR REPORT.

A. Location, population and climate.
B. Geology, topography and contour.
C. Water-supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Houses and their tenancy.
G. Modes of lighting.
H. Refuse and excreta, (how managed.)
I. Markets.
J. Diseases of animals.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Schools and school and other public buildings.
N. Alms-house hospitals, and other charities.
O. Police and prisons.
P. Fire guards.
Q. Cemeteries and burial.
R. Public health laws and regulations.
S. Registration and vital statistics.
T. Quarantine or care over *contagious* diseases and vaccination.
U. Sanitary expenses.
V. Heat and ventilation for dwellings.
W. Health conditions of the year.

Other subjects may be named under X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters which designate the topic treated.

A.

B.

This order has been carefully adhered to by most of the Boards, with much additional information in some of them as to present condition of health or local evils.

The amount of information returned was far greater that had been anticipated, and if printed in full would be of permanent value to the State.

On some of the subjects collateral to health interests, such as A, B, F, K, L, M, N, Q, etc., we have collected a body of definite information of much value in any statistical inquiry into matters of local conditions, prosperity and local development. On matters relating to the public health, the information is far more extensive, reliable and instructive than any heretofore collected. It is the purpose of the Board so to complete this as to make it accessible to citizens who would closely estimate the material desirability, development and healthfulness of the State.

We desire to make acknowledgements of indebtedness to all these Boards who have so fully and faithfully responded. It is impossible to publish all the material thus furnished. We shall only seek by a few specimen reports and by abstracts bearing on particular subjects to show how important is the full information thus secured.

The reports of Newark and New Brunswick will be given in full as specimens of valuable city reports. A few townships will be selected as models in the same way. From others we can only cull a few sentences, and pass many only because there is no specialty of condition or disease requiring our immediate notice. We ask careful attention to these brief notices, as many of them refer to valuable points in local needs or local experience, and so help all in the study of health matters.

After the full reports of Newark and New Brunswick, the rest will be given in the order of counties.

REPORT

OF THE BOARD OF HEALTH OF THE CITY OF NEWARK, NEW JERSEY, TO THE BOARD OF HEALTH OF THE STATE OF NEW JERSEY, FOR THE YEARS 1879 AND 1880, ENDING OCTOBER 1, 1880.

BY CHARLES M. ZEH, M. D.

In compliance with a request of the State Board of Health, the Health Board of the city of Newark, N. J., present the following

REPORT:

The Board of Health of this city is composed of the Mayor, who is President of the Board, the Health Physician and the members of the Committee on Public Health, of the Common Council.

The members of the city Board of Health for the present year are: William H. F. Fiedler, Mayor, who is their President; Isaac A. Nichols, M. D., Health Physician.

Alderman MARTIN B. PROVOST,
PIERSON G. DODD,
JOHN S. CLARK,
Committee on Public Health.

A.—LOCATION, POPULATION AND CLIMATE.

The City of Newark is situated on the west bank of the Passaic river, about eight miles from the City of New York, in the county

of Essex. Its nothern boundary is the township of Belleville and one of the great flexures of the Passaic; on its west lie the townships of Bloomfield, East Orange, South Orange and Clinton; on the south are the townships of Clinton, Elizabeth City and Newark Bay. The Passaic River and Newark Bay form its eastern boundary.

The population includes nearly all nationalities, and by its easy access to New York City, furnishes pleasant homes for a large number of people who transact business there.

Its climate is mild and temperate, having an average temperature of 51.75°—its high range is 100°, and its low range, zero. Its rain fall during the year has been 44.6 inches. With a few exceptions it is delightful and healthy. During seasons when easterly winds prevail, catarrhal difficulties are aggravated by the moist salt air, and in the latter part of summer malarial troubles are increased by miasmata emanating from the great salt meadows, which lie between this city and the city of New York. These cover an extent of ten or twelve miles in length, and seven miles in width, with a soil composed, almost wholly, of vegetable matter, at all times saturated and partly covered with fresh water, which undergoes rapid evaporation and decomposition the effect of which is experienced in the upper portion of New York City and Long Island when westerly winds prevail. The recent diking of these meadows, preventing salt water from flowing over them, which would naturally retard fermentation and decomposition, may possibly be charged as the cause of any excess of malaria here, and for twenty miles or more around us, over that of the years preceeding the diking.

B—GEOLOGICAL.

The soil of the city is composed of red and yellow loams and sand, alluvium and drift, sandy clays, trap rock, shales and conglomerate red and brown sandstone, from which are quarried large quantities of brown stone, of a superior quality, used here and elsewhere for building purposes.

TOPOGRAPHY AND CONTOUR.

In general outline the city is very irregular. Its easterly, northerly, and southeasterly line conforms to that of the Passaic

river and Newark bay. Its longer axis is northwest and southeast. The older settled portion of the city lies about twenty or thirty feet above the sea and river. Thence westerly, quickly attaining an elevation of one hundred to two hundred feet, extending back on this plateau, to Bloomfield, the Oranges and Clinton townships. Its southern, southeastern and southwestern portion is situated on low meadow or flat lands, which are nearly on a level with the bay, and only about twelve feet above the ordinary tides, and during high tide it is partly covered with water. The length of the city is five and one-quarter miles; its width is four and three-quarters miles, and its area about eighteen square miles.

C.—WATER-SUPPLY.

Our water-supply is mainly from the Passaic river, a part from driven wells, and some from wells in various parts of the city, and is at times of an inferior quality.

That taken from the river and driven wells, is collected in reservoirs in different parts of the city, brought from the township of Belleville, through large iron pipes.

The admission of about two million gallons of water from the driven wells, into nearly ten million gallons used by the city daily from the reservoirs, has, in a measure, improved its quality, but there are times when its odor and taste are unpleasant; when chemicals and other substances, soluble and insoluble, are observed. Water, so important an element in our subsistance, when not pure, must necessarily prove deleterious to health and life, and unquestionably serves to increase the percentage of mortality.

D.—DRAINAGE AND SEWERAGE.

Underlying the more thickly populated, and to some extent, the less thickly settled portions, the city is extensively and fairly well drained by a system of sewers, which aggregate forty-eight miles, built of brick and pipe.

All improved streets, paved or unpaved, have stone gutters, which connect with sewer basins, and the water with that of the sewers, emptied into the river and bay, where the drainage soon becomes neutralized by the salt water of the tides. There are,

however, sections which are not thus favored, particularly the southwestern part of the city, where a creek receives the drainage of about twenty-five hundred acres of land, fifteen hundred of which are in the city of Newark, and one thousand in the township of Clinton. The drainage from Newark terminates by two main sewers, and is discharged into a ditch leading to Bound creek near, and west of the crossing of the Pennsylvania Railroad. This crossing has a culvert with a capacity inadequate to admit the free flow of the creek, when swollen with high tide and heavy falls of water; the drainage thus obstructed, causes a deposit of sewerage upon the low lands in the neighborhood, giving rise to bad odors, and must prove most injurious to the health of those residing in the vicinity.

This unfavorable condition has been presented to the attention of the Board of Health and the city authorities at several different times, who are now considering how best and speedily to remedy the evil, but up the present time, no definite action has been determined upon to secure this much needed relief. While our sewerage is fairly extensive, the sanitary requirements are increasing, and demand a more extended sewerage and more thorough drainage to decrease the list of mortality, which has been observed, especially in epidemics of scarlet fever and diphtheria. In some localities where sewers have not been laid, privy vaults and cesspools are defective in drainage, in consequence of rocky and clay bottoms. There are, in different parts of the city, vacant lots, which from their location and surroundings, are covered with stagnant water, producing complaint and disease, but the Board of Health are unceasing in their efforts to correct this condition, by draining, disinfecting and filling.

E.—STREETS AND PUBLIC GROUNDS.

The streets are generally laid out at right angles, broad, and to a large extent shaded by trees. The combined length of graded and paved streets is one hundred and seventy-seven miles—one hundred and thirty-one miles graded only, and forty-six miles paved with cobble stone, block stone, macadamized, Telford and wood. These wooden pavements, now condemned from sanitary considerations, and from want of durability and safety, are giving place to block stone.

PUBLIC GROUNDS.

The public grounds are enclosed parks, large and small. Three of them contain from three to five acres; four are much smaller. The larger parks are elegantly shaded, traversed by paved walks, lighted by gas, drained and furnished with seats. One only has a fountain of constantly flowing water.

F.—HOUSES AND THEIR TENANCY.

In the central portion of the city, included in the fire limits, the buildings are principally of stone and brick. Beyond this limit, they are of stone, brick, wood, &c., generally large, airy and commodious, and well ventilated, supplied with water from the reservoirs and many with drainage, which connects with the general drainage system of sewers, and others with cesspools. Most of the tenement houses are large, comfortable and cleanly, seldom, if ever, overcrowded. Some have modern arrangements for ventilation, but generally doors and windows are the only ventilators. No families live exclusively in cellars. Cleanliness of premises is either voluntary or compulsory.

G.—MODES OF LIGHTING.

Gas and kerosene are the common means of lighting. Electric lights are being introduced, and one of the public markets is wholly lighted by it; also one theatre and other buildings. All other public buildings and streets are lighted by gas. Two and a half million feet of gas is used for this purpose during the year.

H.—REFUSE AND EXCRETA.

Refuse which accumulates in the streets is carried out of the city or deposited in designated places within its limits, for filling low places, daily in nearly all, and two or three times a week in the more remote streets, in wagons for that purpose.

The streets are thoroughly and well cleaned at intervals, but the large surface of cobble-stone pavement, irregular and uneven in many places, requires more frequent attention than is given, for the securing of health and comfort. And there can be bu

little doubt, that from the want of more attention in this particular, the malaria of our locality is increased.

The refuse from butcher and meat shops, under constant inspection by intelligent officers, is never allowed to accumulate or become offensive, but is removed in wagons to be utilized. If there should be exceptions to the rule, it is so by criminal negligence of parties who create the refuse.

Excreta is removed from the city in covered tubs or casks or tight box-wagons, when required by individuals, or by order of the health officer upon complaint.

I.—MARKETS.

There are two public markets, which are well managed institutions, conspicuous for neatness, good order and system. They are large, convenient and scrupulously clean.

J.—DISEASES OF ANIMALS.

The diseases of animals have been through the year, of a mild and ordinary character, till within the month of September, and to this date, an epidemic influenza or epizooty of a contagious character has prevailed. Fortunately recovery is the rule.

Dead animals, whenever reported, are removed at once in closed ambulances, to be utilized, or by scavenger wagons with refuse.

K.—SLAUGHTER-HOUSES AND ABATTOIRS.

Slaughter-houses and abattoirs are under the constant observation and control of the meat and health inspectors, who compel cleanliness and inoffensiveness. There are two slaughter-houses within the city.

L.—MANUFACTORIES AND TRADES.

This city is essentially a great workshop, and is one of the most extensive manufacturing cities in the Union; it includes nearly every variety of trade known in any civilized country, with artisans and workmen from every nation. The structures are generally supplied with most modern and improved machinery, and arranged for the convenience, health and safety of their occupants. In a city so large, so wealthy and enterprising, all

trades must and have exhibited a most rapid growth, and commerce has assumed large proportions.

M.—SCHOOLS AND PUBLIC BUILDINGS.

Our schools are under the management of the Board of Education. The number of teachers in the employ of the Board is two hundred and seventy, of which twenty-six are males and two hundred and forty-four are females. The Board occupies twenty-eight buildings for actual class-room work. The enrollment in the day schools is eighteen thousand five hundred and twenty-three, and the evening, nine hundred and fifty-five; in the normal school, sixty; high school, four hundred and eighty-nine; grammar school, four thousand six hundred; primary schools, twelve thousand seven hundred and sixty; colored schools, two hundred and twenty, and industrial schools, three hundred and ninety-four. The work of teachers is earnest and successful. The school buildings are large, elegant and expensive, intelligently designed for healthfulness, safety of their inmates and convenience for pupils and teachers.

These, and all other public buildings, possess most of the modern improvements that the tests of time and experience have approved, for ventilating, heating, lighting, draining and other necessary sanitary arrangements, and under the constant vigilance of the Health Physician and officers of each of the departments and interested citizens, are becoming more schooled to the necessity of preventing diseases, and increasing the means for promoting health and comfort, safety and convenience.

N.—ALMS-HOUSES, HOSPITALS AND CHARITIES.

There are many charitable institutions in the city, one of which, the alms-house, is a large building, situated on the outskirts of the city, from which drainage is easy. It is commodious and under good sanitary arrangements and regulations. No epidemic diseases have occurred during the year. There have been twelve deaths of adult males, four females and six children. The alms-house sick are under the direct care of the alms-house physician. An eye and ear infirmary has been established during the year by enterprising benevolence, and is thus maintained. A corps of capable surgeons is in daily attendance in this in-

stitution, who receive and treat all applicants for services, free. Over three thousand patients have received treatment during the year. The city has no hospital, but contributes the sum of $5,625 (for beds) annually, in equal amounts to St. Michael's Hospital, (R. C.) which institution is under the care of the Sisters of the Poor; the Hospital of St. Barnabas, (Episcopalian) and the German Hospital. There is also an Alms-house Hospital, which is used as a pest-house, when circumstances require.

A dispensary is open daily with a corps of physicians in attendance upon those who are not able and not required to pay for medical services. Besides hospitals, dispensary and eye and ear infirmary, the benevolent institutions include The Female Charitable Society, Orphan Asylum, Foster Home, Home of the Friendless, Women's Christian Association or Home for Working Women, Boys' Lodging House and Children's Aid Society; nine temperance benevolent societies; Roman Catholic; Society for the Relief of the Poor, three Orphan Asylums, Hospital and Industrial School, Schools of Brothers and Sisters of Charity, Home for the Aged, House of the Good Shepherd for the wayward. Two police stations afford temporary relief to wayfarers, and during the past year has given lodgings to 20,432, of which number 19,775 were males and 657 females. Eight city physicians attend at their homes, all the sick and injured poor who apply to them.

BATHING HOUSES.

There are two bathing houses (public.) The bathers number this year 112,164 males, 16,608 females. Total, 147,762.

O.—POLICE AND PRISONS.

Eighty-two miles of streets are under police supervision. The police force at present is one hundred and fifty men, uniformed, drilled and disciplined, daily in attendance at each of the two police stations, day and night, under the direction of sergeants, captains and chief of police. In the station-houses are lodging rooms for policemen, wayfarers, offenders of the peace and prison cells for criminals, for both males and females. In these buildings are running water, wash basins and water-closets, as

well as other necessary conveniences, well appointed, duly inspected and fairly clean.

P.—FIRE GUARDS.

The Fire Department consists of a Chief Engineer, four Assistant Engineers, one Superintendent of Fire Alarm Telegraphers, and an acting force of one hundred and ninety-eight men, of which thirty-eight men are permanent; ten steam fire engines, ten hose carriages, two hook and ladder trucks, one supply wagon and one gig, thirty-nine strong and capable horses, a fire alarm circuit of sixty miles of wire, ninety-two fire alarm boxes, one thousand one hundred hydrants, and fifty-two public cisterns. At all fires is a salvage corps, maintained by the Insurance Underwriters' Association. The Fire Department will compare favorably with the best in this or any other country in organization, discipline, appliances, bravery and efficiency.

Q.—CEMETERIES AND BURIALS.

Within the city limits are three cemeteries and several burial grounds. The cemeteries are laid out and arranged with great care and expense, beautifully shaded, traversed with labyrinths of avenues and walks, ornamented with flowers and shrubs, and containing reception vaults; under the care of superintendents and keepers, and these under the control of the city health officers and common council.

There are also burial grounds which are in disuse, but well preserved and enclosed, and a city or public burial ground, (Potters field) where burials are free.

R.—PUBLIC HEALTH LAWS AND REGULATIONS.

The laws and regulations of public health here are necessarily extensive, an epitome of these may be obtained from the powers and duties of the Board of Health, and of officers who constitute that Board, whose meetings are held at such times and places as they may deem proper to provide for the protection and maintenance of the health of the city, by compelling cleanliness, preventing and abating and removal of nuisances, by sending non-residents with infectious diseases to the pest-house or hospital.

The removal of residents to the hospital upon recommendation, the removal of all or any residents to the pest-house who have infectious diseases, upon the written certificate of two physicians and of the Health physician, declaring the removal necessary for the preservation of the public health, the removal of disinfected goods when suspected of infection.

The purchase of medicines and remedies under the direction of the health physician, who also has control over the crews and passengers of vessels and crafts suspected of having infectious diseases on board, entering the city except by permission under penalty.

By causing to be displayed conspicuously upon houses where small-pox and other infectious diseases exist, signs, which shall not be removed without permission, under penalty.

The providing of suitable nurses for pest-houses, and by preventing any person from throwing offensive or unwholesome substances on the streets, ordering cesspools to be built and kept in order, sinks cleaned at night in an inoffensive manner.

Giving permission to clean sinks or privies by day, by certain processes, and by appointing sub-inspectors of health, and meat inspectors. These inspectors are under control of the health physician and Board of Health who hold their regular meetings monthly, and preceeding the meeting of common council.

S.—REGISTRATION AND VITAL STATISTICS.

Records are required from clergymen, of marriages, and from physicians of births and death, at stated intervals, to be sent to the City Clerk. The number of people in this city, according to the last census returns just made, is 137,163; of these 66,407 are males, and 70,756 are females; 96,841 are natives, 40,322 are foreigners; 133,874 are whites, 3,308 are colored (blacks and mulattoes); 10 are Chinese and 4 are Indians. The number of children between five and eighteen years of age is 41,935. The number of births during the year was 3,693. The number of deaths 2,851, and the number of marriages, 1,225.

U.—SANITARY EXPENSES.

The appropriation for the present year to the Board of Health is $9,000.

V.—HEATING.

Nearly all the public buildings and many private dwellings are heated by steam, others by furnaces, but the greater number by stoves; the fuel is coal.

ITEM.

It will be observed that the list of mortality in this city, from October 1st, 1879, to October 1st, 1880, is 2,851 which number 200 includes still-born, and many from the three hospitals, county insane asylum, county jail and soldiers' home, who were non-residents. Deducting these, our rate of mortality which is now 20.8 per 1000, would be somewhat decreased. In presenting this first report of the City Board of Health to the State Board, we have endeavored to give a fair and just report, so far as observation and limited data could aid us.

We regret that the health physician, who has filled this position, ably and well, for many years, could not have given to your board, the result of his intelligent observations and experience, acquired from unceasing and untiring efforts, moral and physical, to enhance and improve our sanitary condition. His seriously impaired health has left the acting physician wholly dependent upon other resources, which necessarily render these papers less complete, and less perfect than a report from his hands. Respectfully submitted,

C. M. ZEH,
Acting Health Physician.

ANNUAL REPORT

OF THE BOARD OF HEALTH OF THE CITY OF NEW BRUNSWICK.

BY H. R. BALDWIN, M. D.

NEW BRUNSWICK, N. J., October 1, 1880.

To the Honorable, the Common Council of the City of New Brunswick:

GENTLEMEN: The act entitled "an act concerning the protection of the public health and the record of vital facts and statistics relating thereto," makes it the duty of the Board of Health

of the City of New Brunswick to submit to your honorable body, on or about the first of October of each year, an annual report of the condition of the public health in our city, with other facts of interest in that connection.

The present Board of Health was organized under the provisions of the said act, on May 8, 1880. The gentlemen composing the Board, nominated by the Mayor and approved by Common Council, are Prof. D. T. Reiley, Mayor of the city, Drs. Henry R. Baldwin and Nicholas Williamson. *Ex-officio* members: Edward Tindell, Recorder of Vital Statistics, and Dr. Staats V. D. Clark, City Physician. The officers elected by the Board were D. T. Reiley, President; Edward Tindell, Secretary; S. V. D. Clark, Treasurer; Edward A. Reiley, Inspector.

Since the date of organization, stated meetings have been held weekly and semi-monthly, and considerable work has already been accomplished through the active agency of the Health Inspector, in regard to all forms of nuisance and matters deemed detrimental to public health. The Board was compelled to plan its work with some care. It was necessary, at first, to understand the general provisions of the act referred to, as well as of the new ordinance for the prevention and correction of nuisances, etc., approved September 16, 1879. Committees were appointed to hold conferences with the Commissioners of streets and sewers and the City Attorney, the object being to define the relative duties of the two Boards. By adopting this course, there has been no conflict of authority, but unity of action in the important work of guarding the public health. The members of the Board have cheerfully given their time and attention to a careful investigation of all matters of complaint, unpleasant as the nature of many of these complaints have been. This work, as your honorable body understands, is gratuitous, no member of the Board receiving any compensation whatever. As there was no appropriation voted by the people to prosecute this work, although five hundred dollars was recommended for its accomplishment, it was necessary to ask your honorable body to make some provision for the pay of the Health Inspector, (an office created by the law, above referred to,) and a prompt compliance on your part with the request enabled the Board to go on with its work.

We do not deem it necessary to specify the various nuisances

that have been abated during the past summer. A record of all forms of inspection and complaint has been carefully preserved by the Inspector, and all important reports, papers, etc., have been filed by the Secretary for convenient reference. Whenever it has been necessary the Board has directed the application of legal force, under the direction of the city attorney. The complaints, fortunately, in but one or two instances, only being prosecuted under the provisions of the ordinance of September, 1879. In this connection we annex the number of inspections made, permits issued, and complaints investigated, from May 18 to September 30, 1880, inclusive, as follows:

Complaints	91
Inspections	278
Permits	237

Care has been exercised to conduct this work so as to avoid, as far as possible, unpleasant feelings between neighbors, and to exercise compulsory force only when absolutely necessary.

At a meeting of the Board held on May 24, the Health Inspector was instructed to inspect the First and Second Wards, with special reference to the condition of drains and the facilities for the escape of waste-water and sewage. A report was made showing the result of this inspection, which was approved by the Board. A committee was subsequently appointed to make a further examination of these water-courses, particularly what is known as "Fisher's Brook." An important paper on "Disinfectants, and How to Use Them," was also prepared by the Inspector and approved by the Board; also a paper on the "Condition of the Gutters of this City," by Dr. Clark.

The above reports or papers were furnished by the Secretary to the newspapers of the city for publication, and the proprietors of these journals, recognizing the importance of intelligent suggestions touching upon sanitary precautions or recommendations, cheerfully made room in their columns for these papers. These suggestions were thus brought to the homes of our people and made of practical benefit to them.

A record of vital statistics, as reported to the Secretary of State, by the City Clerk, for five months, or from April 15 to September 15, inclusive, we here annex, as follows:

Number of marriages, 52; number of births, 173; number of

deaths, all causes, 197; number of deaths of children, under five years, 96; number of still births, 19.

In reference to the general health it becomes our duty to report any serious deterioration thereof or hazard thereto; and in accordance with this enactment we beg to report as follows:

We are happy to say that there has been no more serious deterioration of the general health than has heretofore existed, save with two exceptions. The usual amount of infantile disease has existed, but not in malignant form. Still during the early summer the extreme heat was quite inimical to the lives of infants. Contagious and infectious diseases have also visited us, but not in such form as to be beyond control. One of the above exceptions has reference to the unusual prevalence of malarious diseases, which have been present in a degree unknown in this community during the last quarter of a century. Frequent cases of intermittent and some remittent fevers have called for the timely aid of the physicians. This seems to be largely due to the character of the last winter, and the absence of severe frosts, and somewhat also to the subsequent drought. The soil being saturated with vegetable matter in condition for decay, and the summer sun liberating the emanations, which have produced their characteristic effects. It may also be stated that the recent raising of the dam, at the site of the water-works, and the consequent flooding of new meadow land, may have so impregnated the drinking water with vegetable matter as to afford a suspicion that some of the intermittent may have arisen from this source.

The second instance of deterioration of the public health may be noticed as the prevalence of a number of cases of typhoid fever. As this is classed among the preventable diseases, it should exist only in the least possible degree; and whilst in the absence of positive statistics, it is unsafe to state positively the amount of typhoid prevailing in our midst; yet from inquiries directed to several physicians, whose practice covers a considerable portion of the town, it seems that we have more cases of this disease than belong to a city of good sanitary condition; but it is safe to assert that a general absence of the conditions of salubrity must exert a powerful influence in producing the disease, such as water taken from impure wells, bad sewage, and the foul condition of the gutters, which latter exists to an outra-

geous extent, and in the absence of legislation empowering the Board of Health to act promptly, must necessarily continue. Regarding any hazard to the public health, we are happy to say that an abundant supply of water, in general of wholesome character, (with the exception of the hint above given, and which is only temporary) has afforded a great protection; yet there are some portions of the town in which the water is drawn from wells, which are liable to all the deterioration arising from soakage of the soil with detrimental substances. We cannot pass by another large danger to the general health of the city, from our imperfect system of sewage which now exists, viz: the emptying of our sewers, as well as all the surface drainage of the streets into a slack water, (the Delaware and Raritan Canal). It will be readily seen that the deposit of animal and vegetable matter, the refuse of a large town, must contain elements most prejudicial to health. When, therefore, this basin is exposed to the sun as is occasionally the case, with its bottom covered with reeking filth and human excreta, can we conceive a more unwholesome state of affairs. It is not asserted that the germ or poison of typhoid is thus propagated, still there can be no doubt that the influence upon the general health is such as to favor the development of whatever specific causes of disease may either exist or arise.

SUGGESTIONS.

The Board of Health suggests the following amendments to the present ordinance:

To Sec. 3. And anything whatsoever that shall be deemed by the Board of Health prejudicial to the health of the community.

To Sec. 9. That no animals be buried within the city limits without the permit of the Board of Health.

To Sec. 10. That the Board of Health at any time may require the owner of any cesspool and privy-vault to cement it in such a manner as to make it water-tight, and that all cesspools and privy-vaults hereafter constructed to be under the same authority.

To Sec. 18. The carrying on of all occupations should be under the control of the Board of Health so far as they may judge them to be nuisances or injurious to health, and permits must be obtained from the Board of Health for carrying on such business.

The right of the Board of Health, or their officers, to enter premises, has been omitted from the new ordinances and should be inserted.

Persons should be required to use disinfectants upon their premises according to the judgment of the Board of Health. Quicker action should be possible than a three days' notice, as in case of an epidemic or a recently created nuisance. The Board of Health should have the fullest power to vacate, disinfect and cleanse premises, or cause them to be so vacated, cleansed and disinfected.

Houses occupied by two or more families (tenement houses) to be furnished by the owners with proper means for carrying away waste-water, slops, etc., to be constructed in accordance with the directions of the Board of Health.

Whenever sewers exist, the Board of Health should have the power when they deem necessary of compelling connections to be made therewith.

The following points can only be reached by application to the Legislature:

1st. Greater power and clearer procedure of the Board of Health when nuisances are within the domain of the commissioners of streets and sewers.

2d. Physicians should be obliged by law to furnish reports periodically of contagious and infectious diseases to the Board of Health.

Respectfully submitted,
D. T. Reiley,
Henry R. Baldwin,
Edward Tindell,
Committee.

Attest: Edward Tindell, Secretary.

Accepted and ordered filed by Common Council, October 4, 1880.

Edward Tindell, City Clerk.

ATLANTIC COUNTY.

ABSECON. - - *Report from* E. H. MADDEN, *Absecon.*

ATLANTIC CITY. *Report from* THOMAS MCGUIRE, *Atlantic City.*

C.—The water-supply at present is from cisterns. The carelessness of many of the old inhabitants in not attending to their cisterns properly is the cause, no doubt, of some sickness. Others not having cisterns, use the surface water, and, I think, in the fall of the year this causes malaria. I am in hopes before another year we shall draw our supply of water from the mainland or artesian wells.

V.—One of the most important functions of the Board is that concerned in the investigation and suppression of nuisances. There are a number of cases reported, and some are so complicated that they involve careful and patient investigation and assiduous care in their management. A great deal of unnecessary, as well as unpleasant labor, is forced upon the Board by the refusal of persons, after proper notification, to abate nuisances for which they were responsible, thereby obliging the Board, in furtherance of the public weal, to authorize the work to be done, and institute proceedings at law for the recovery of the expense. We feel that there is a straight line of duty to pursue, and as far as we know the right, we mean to pursue it.

The importance of a sewer system based upon a regular established grade is insisted on. This illustrates how important it is that every city should have a complete sanitary sewerage and map as preliminary to all drainage, sewerage, or grading plans.

BUENA VISTA, - - *Report from* JOHN FAUX, *Vineland.*

EGG HARBOR TP., - - *Report from* L. CONOVER, *Absecon.*

The only prevalent disease reported is that of chicken cholera. It may be said here that under the head of diseases of animals, many of the reports from various sections of the State allude to the disease and the serious loss to farmers thereby. A new

interest attaches to it from the fact that Touissant and Pasteur seem recently to have shown that the disease is owing to an oval-shaped micro-organism. Pasteur has taken this and cultivated it in other media, such as decoction of muscle. The germs from a decided case are made to multiply in a muscle-decoction or culture fluid. If this fluid is used at once it produces a severe form of the disease. But if allowed to stand for months and then used, it produces a very mild form of the disease, which protects the fowl from another attack, just as vaccination protects from small-pox. Pasteur is believed by many to have discovered a method not only of preventing the virulence of fowl cholera, but also that of hog cholera, pleuro-pneumonia, and many other diseases of animals. The subject is of the greatest interest, not only pecuniarily, but in its bearing on human diseases.

GALLOWAY TP., - *Report from* GEORGE W. ALLEN, *Oceanville.*

The report notices pulmonary diseases as affected or produced by the heavy sea air.

HAMILTON TP. *Report by* D. B. INGERSOLL, M. D., *May's Landing.*

The report presents answers to all the schedules, and is emphatic upon the increasing evils arising from the use of tobacco as an "injury to the health of community and especially to the youth and children of our land." The increase of this use by those young in years is certainly a subject worthy of the attention of our citizens Some cases of typhoid-malarial fever, a disease unusual in that section, are noticed.

HAMMONTON TP. - *Report by* M. L. JACKSON, *Hammonton.*

MULLICA TP. - - *Report by* W. S. MILLER, *Pleasant Mills.*

The report properly protests against the careless deposit of the garbage of Atlantic City, brought to it, under contract, on cars, which themselves become offensive and hazardous to the public health. This township was one of those in which, at first, a Board of Health was felt to be unnecessary, but soon had an

illustration of how important it is to have some health authority in every district.

WEYMOUTH TP. - *Report from* ANTHONY J. PARKER, *Tuckahoe.*

BERGEN COUNTY.

LODI TP. - *Report from* JOHN VANBASSUM, *Coroner.*

MIDLAND TP. - *Report from* JOHN G. ZABRISRIE, *Areola.*

The report notices nothing unusual, save the uncommon prevalence of malaria.

NEW BARBADOES TP. *Report from* H. H. ZABRISKIE, *Hackensack.*

The prevalence of malaria is noticed. We quote from the close of the report as follows:

"The operations of our Health Board since its existence, have been satisfactory in good results, by awakening the attention of our people to the existence of unsanitary conditions in their midst; many of which have been radically changed.

"If our Legislature will make more definite the manner of prosecution for delinquencies in regard to sanitary observances together with a much needed provision for the appropriation of pecuniary means by the township committee, for securing needed reforms, we have before us, through the increasing sanitary knowledge of our population, the prospect of good work soon to be reported, for the whole field of our supervision."

PALISADE. - *Report from* PETER BENDER, *Schraalenburgh.*

The report refers to malaria as common, although not so severe as the previous summer. Bronchial and lung troubles also seem on the increase, as is generally the case where there is imperfect drainage and accumulations of vegetable matter.

RIDGEWOOD, - - *Report from* I. A. MARINUS, *Ridgewood.*

SADDLE RIVER, - - *Report from* W. H. GILL, *Ridgewood.*

UNION, - - - *Report from* G. R. ALYEA, *Rutherford.*

BURLINGTON COUNTY.

BEVERLY CITY, - *Report from* ELIAS LONGSTREET, *Beverly.*

The Board has inspected the cellars, wells, privies and drains of a large part of the town, and requested citizens to report all nuisances on public or private grounds.

BORDENTOWN TP., *Report from* LUCIEN HUNT, *Bordentown.*

BORDENTOWN CITY, *Report from* DANIEL G. WALKER, *Bordentown.*

The town is defective in its drainage and sewerage.

BURLINGTON CITY.

The report shows a well organized Board, but owing to the lateness of its organization, full items could not be furnished.

CHESTER TP., - - *Report from* I. C. STROUD, M. D.

There has been intermittent fever of an unusually severe type. A fever would set in and last for forty hours, and the patient would be very delirious * * We have a low, flat stream of water, very sluggish in its motion, and an abundance of weeds and grass all along the stream for seven or eight miles, to which has been attributed the great amount of fevers in our neighborhood.

CHESTERFIELD TP., - *Report from* CHAS. D. LIPPINCOTT, *Crosswicks.*

CINNAMINSON TP., - *Report from* I. D. JARNEY, M. D., *Cinnaminson.*

EASTAMPTON TP., - *Report from* WM. G. LIPPINCOTT, *Mt. Holly.*

Some malaria this year, and a severe type of diphtheria.

LITTLE EGG HARBOR, - *Report from* T. T. PRICE, M. D., *Tuckerton.*

The report speaks of the uniform health of the township: "Its mild, marine climate renders it a favorable abode for consumptives. We have no malaria."

LUMBERTON, - - *Report from* ISAAC FENMORE, *Lumberton.*

MANSFIELD, - - *Report from* AMOS BLAKE, *Columbus.*

NEW HANOVER, - *Report from* GEORGE C. DAVIS, *Wrightstown.*

"There is no system of drainage or sewerage other than by natural means, or what may be built and used by private parties as they may individually think necessary, refuse and excreta being disposed of as is customary among farmers. I would here just mention to the Board the great neglect of farmers owning marshy and low lands, in not draining them. Almost every farm in the township has several acres of that kind of land, which could be converted into good land for pasturage, worth more, acre for acre, than any on their farm, besides making their plantations more healthy. In fact, I believe these low, marshy places, running up, as they do in many instances, back of the dwellings of those that live in them, are the cause of so many diseases. The water becomes stagnant and polluted with all the foul gases of the air, therefore creating the very germ for malaria, &c. I would here call the attention of your honorable Board to the necessity of having a uniform system of drainage throughout the State, both for the interest of the farmer and the welfare of humanity in general. I would here suggest to your honorable Board that it appeal to the Legislature, at its coming

session, to make a provision in some way to encourage a system of thorough drainage throughout the State."

"Some of our school-houses are badly ventilated, being built in olden times, when people built school-houses to correspond with their out-buildings on the farm, not caring for the health and comfort of their children any more than they did for their swine, crowding their children together in low, cramped-up buildings, inhaling the same air over and over again, until sickness came upon them, to be taken home to be physiced up, to go through the same process again."

NORTHAMPTON, *Report from* F. ASHURST, M. D., *Mount Holly.*

PEMBERTON, - *Report from* WM. P. MELCHER, *Pemberton.*

There are no other public buildings except the Burlington County Poor-house, situated two and a half miles east of the borough of Pemberton. This institution was founded in the year 1800. The farm comprises six hundred acres, of which four hundred and thirty is tillable land, the balance brush and woodland. The institution comfortably accommodates three hundred and twenty-five inmates. The number at present is two hundred and seventy, females being slightly in the majority. Number colored, forty. In the insane department there are: males, twenty-three; females, forty-five. Number discharged, improved, during the last six years was twenty-nine; males eight, females, twenty-one. Of this number (29) eleven (two males and nine females) came from the State asylum. Average number of inmates for year ending May 12th, 1880, three hundred and fifteen; number of deaths, twenty-seven; births, seventeen.

RANDOLPH TP., - *Report from* CHAS. T. ALLEN, *Lower Bank.*

SOUTHAMPTON TP., - *Report from* J. H. BROWN, *Vincentown.*

The only thing that we are bothered with as a prevailing disease is the ague.

WASHINGTON TP., *Report from* CHAS P. NICHOLS, *Green Bank.*

CAMDEN COUNTY.

CAMDEN, - *Report from* ALEX. J. MILLIETTE, *Camden.*

CENTRE TP. - - - - EZRA C. BELL, *Mt. Ephraim.*

There have been some cases of malarial fever this year.

DELAWARE TP. - - - ABEL HILLMAN, *Haddonfield.*

The prompt action of this Board, in reference to a case of mall-pox which occurred in a laborers' boarding house, no loubt prevented the extension of the disease.

GLOUCESTER CITY. - - ALFRED HILLMAN, *Haddonfield.*

This Board has issued every precaution they thought necesary, looking to the city's welfare. Communications from the ity Physician, with reference to nuisances and of parties having iem, having been received, their places have been visited by ie Board and the evil abated. There were one thousand 1,000) circulars printed and distributed throughout the city, alling the attention of citizens to the uncleanliness of yards and ther places.

The Camden county Alms-house contains one hundred and fiftyve patients, and a new hospital has been erected during 1879, aving a capacity for forty beds, and will probably be opened or the reception of indigent patients during the year. On the ame county premises, there has recently been built an asylum or the insane, with accommodation for seventy-five patients. Present number, fifty-eight.

The Board made a careful inspection of these two institutions, nd found the sanitary condition good, except the ventilation nd sewerage of alms-house, which are sadly defective. The asylum was found perfect in every respect, except a roper ventilation of water-closets, these being inefficient to convey ff the various odors emanating from them. The local Board of

Health respectfully refer the same to State Board of Health for their investigation.

The general health of these two institutions has been impaired by the prevalence of malarial fevers, which are endemic to the locality, and cannot be prevented only by large expenditure or removal of the buildings from their present sites, which are located on the south side of a drained meadow, receiving all the decayed vegetable matters for several miles up the stream. Their drinking water is obtained from a pond covered, during the warm season, with algae, and when carried to the respective buildings contains the deposit to a visible extent. No epidemic diseases have prevailed and the inmates have been thoroughly vaccinated. All our school trustees have, within the knowledge of the Board, complied with the requirement of the law in having all the children in the respective districts vaccinated.

As a supplement to this report, permit us to refer briefly to a circumstance by which a timely precaution and investigation has averted an outbreak of typhoid or typho-malarial fever. At the County Insane Asylum a well was dug in July, eighteen feet deep, outside of main building but inside of a rear annex, in close proximity to a main sewer pipe; the water, after a few days, became intolerably offensive to taste and smell, so that it was advised by the attending physician to abandon it and close it securely. Various theories originated in reference to the impaired quality of water from this well; some attributed its offensiveness due to organic matter from the old pauper graveyard, upon which the building was erected in 1879, others to a leakage in the main sewer pipe, which had either accidentally been struck in digging the well, or from fracture of pipe, caused by settling of foundation walls of the building. The latter supposition we regard as most probable, and a careful analysis of the water, made by an expert chemist, reveals its constituents as phosphates, sulphrates, and a large per cent. of organic matter.

The officers of institution propose having sewer pipe carefully examined. Signed

R. B. STEVENSON, *Chairman.*
E. J. COLES, *Secretary.*
J. W. MCCOLLOUGH, M. D.,
Township Physician.

Dr. McCullough also furnishes the following account of a number of severe cases of sickness that occurred in Gloucester and Centre townships.

BLACKWOODTOWN, N. J., September 29, 1880.

DEAR SIR: Excuse delay in complying with your request, in contributing to you the desired information in reference to a sickness which prevailed in this locality. The cases occurred in the townships of Centre and Gloucester, which are situated five to ten miles southeast of Camden city, bounded west by Timber creek, (a tide-water creek,) flowing into the Delaware. The inclosed map, hastily drawn, for your better understanding of the situation, will also give you a correct idea of the geographical limits of the fever.

I have a record of thirteen cases, personally treated, and as many more occurring in the same locality, and treated by my colleague, Dr. H. E. Brannin, also Doctors Shivers and Quint; total, thirty cases. The first cases occurred about the first of August, 1879, and obtained the greatest prevalence in September, with a few cases in October, and all ceased in November. The area of county infected was two miles in extent, and as near as I am able to estimate, one person in six and two-thirds of population contracted the fever, and the death rate was nearly nineteen per cent. The deaths in my practice, from the so-called typho-malarial fever, were two, and total six in the practice of all the attending physicians.

The incipient stage was marked with the usual premonitory symptoms of languor, mental depression, feeling of coldness down the back and persistent headache, with succeeding febrile symptoms, furred tongue, frequent pulse, epigastric tenderness, and urine scanty and high colored; the diurnal remissions occurring in the morning, and exacerbations taking place towards evening. This condition remained for an indefinite period, until the remission became less noticeable and until the thermometer failed to detect any but a steady and unvaried course of fever of a typhoid character. The principle features were a pulse varying from one hundred and twenty to one hundred and fifty, temperature one hundred and two to one hundred and four, dry, red, and brown tongue, generally a bronchial complication, tympanitis, and often profuse diarrhœa, slightly hemor-

rhagic, delirium relapsing into stupor, and the cases terminated before twenty-first day, in death or a tedious convalescence. The treatment pursued was the alkaloids of cinchona, first, and alteratives, and after assuming the typhoid character we abandoned quinia and substituted the acids with stimulants, beef tea, milk, &c., with turpentine and bromidis and opium, to meet local indications. These cases occurred in a malarial locality, along the east side of Timber creek, where intermittents every year prevailed and afflicted the old residents all their lives.

It was the frequent observation of watermen, who followed the creeks, and the residents, in close proximity to the same stream, that the tides were lower last season than any previous period in their recollection, which would account for the greater prevalence of malaria; but this theory is not well sustained, and, in my opinion, there was less intermittent in 1879 than in the present year 1880.

To properly and effectually solve the real origin of the typhoid element, which was one of the conspicuous features, we must search for the principal cause, viz: The use of material which had been hauled from Philadelphia, and extensively employed by farmers and truckers on their lands, and from deposits on the various landings on the creek. These fertilizing manures were ill-smelling and offensive at considerable distances, and consisted of street dirt, blood from abattoirs, and soap fat, &c., from Philadelphia. The majority of cases occurred in the vicinity of a putrid heap of manure, and all fatal cases, with one exception were in the same locality as the manure pile.

A farmer who dealt extensively in this latter material lost a son, and his two daughters were simultaneously seized and prostrated with the same fever, recovering, finally, after a tedious convalescence. Another farmer, his nearest neighbor, quarter of a mile distant, was stricken, afterwards a daughter, both of whom died. Directly across the road, a young married lady was prostrated and died; many others, at close distances from the first outbreak, were taken. It has been suggested that impure water might have been found at the door of these families, and the water might have developed, by analysis, some organic matter, as hog pens and barn yards were sufficiently near three places, where the fever occurred, to give a semblance of truth to this

theory; but these families had been drinking water from the same wells for many years and the water was apparently healthy in quality. I cannot share in the opinion that this was the chief cause. There have been no cases of fever of a typhoid grade in this locality the present season. The inhabitants are drinking the same water and throw their deposits of house on the soil near the house. No more of these offensive manures have been used in the neighborhood since 1879, and since we have had no outbreak of fevers.

HADDON TP., - - - J. STOKES COLES, *Haddonfield.*

STOCKTON TP., - PHILIP W. BEALE, M. D., *Cramer's Hill.*

Three cases of small-pox which occurred were promptly attended to, and houses fumigated and vaccination performed. There was no further spread.

CAPE MAY COUNTY.

CAPE MAY CITY, - - ELDRIDGE JOHNSON, *Cape May.*

The Board has several times abated nuisances. The following is a part of their ordinance and their form of notice:

SEC. 2. *And be it further ordained and enacted,* That the Board of Health shall have power, and it shall be their duty, to make and by order direct to be made, through the Mayor, by the Marshal or any police officer, diligent inquiry with respect to all nuisances, of every description, which are or may be injurious to the public health, and to abate the same in any way or manner they may deem expedient. Second—to stop, detain, examine, and by order to direct to be stopped, detained and examined for the purpose of preventing the entrance of any pestilence or contagious or infectious disease in the city, any person coming from any place infected or believed to be infected with such disease, and to prevent such person from coming into the city. Third—to remove from the city or cause to be disinfected or destroyed any furniture, wearing apparel, goods, wares, merchandise, diseased animals or other property of any kind landed by railroad or

steamboat or other conveyances, or stored in the city, which shall be suspected of being or sworn to be tainted or infected with pestilence, or which shall be likely to pass into such state as to generate or propagate disease.

SEC. 3. *And be it further ordained and enacted*, That every person who shall be served with a copy of any order made by the Board of Health, under the powers conferred by this ordinance, and shall neglect or refuse to obey, or comply with the same, shall forfeit and pay, upon due proof before the Mayor or Alderman, a fine of twenty dollars for every offence, and stand committed until fine and costs are paid.

LOWER TOWNSHIP, - - CALEB WOOLSTON, *Fishing Creek.*

CAPE MAY POINT, - - D. C. GODFREY, *Cape May Point.*

CUMBERLAND COUNTY.

BRIDGETON, - - - DANIEL B. GINENBACK, *Bridgeton.*

The report furnishes particulars, valuable for future reference, as do many others from which no special extracts are made.

DEERFIELD, - - - - JOHN W. AVIS, *Deerfield.*

HOPEWELL, - - - CHAS. H. DARE, M. D., *Shiloh.*

LANDIS, - - - - - - WILLIAM ROBERTS.

A full report of all details as to the township.

MAURICE RIVER, - - - ISAIAH LORD, *Heislerville.*

STOE CREEK, - - - EPHRAIM MULFORD, *Roadstown.*

Millville and Downe report Boards of Health.

ESSEX COUNTY.

BELLEVILLE, - - - D. M. SKINNER, M. D., *Belleville.*

The report notices improvements being made in the condition of streets and in drainage; the good arrangement for preserving life and property in case of fire, and the need of improvement in one of the school buildings.

BLOOMFIELD, - - - JOSEPH K. OAKES, *Bloomfield.*

U.—We have spent sixty dollars the last six months, the most of which was expended in ditching a piece of ground (about six acres) near the centre of the town. The sewerage from neighboring houses was deposited on it. By making this ditch, we get rid of this sewerage in a great measure, and have made the land through which it passes comparatively dry. We think it will be the means of increasing the health of that part of the town. We expended ten dollars in another part of the town, to cut a ditch so as to drain a stagnant pool of water. The Board has had a number of complaints on account of nuisances. The Secretary has written notices to those persons complained of, who have, in most instances abated the same. We would suggest that the Board of Health have power to appropriate money for sanitary purposes. It might be limited not to exceed a certain sum, say one hundred or two hundred dollars for one year.

W.—Complaint was made to the Board early in the season, of the condition of the water in Toney's brook. The Board investigated the matter, and came to the conclusion that the impurities of the water were caused mostly by factories in Mt. Clair township. On the stream, in Mt. Clair, there are two factories; the upper one, where they make and print labels for all kinds of goods, the refuse coloring matter they throw in the stream. The lower factory in Mt. Clair, is a straw-board factory; in preparing the straw and reeds, (from the salt meadow) they use alkalies and acids, and a considerable portion of the refuse gets into the stream. Also, over the stream, in Mt. Clair, there is quite a number of privies. The consequence is, when the water gets in the next pond below, which is in Belford, it is pretty well satu-

rated with impurities. There are three ponds in a circumference of half a mile in Bedford. When these ponds are low, in warm weather, it takes some time for them to fill up; in the meantime, the sun acting on this mass of polluted water, causes a smell or gas, which is injurious to the health of the place. We wrote to the Montclair Board of Health, to ask them to co-operate with us in the abatement of the nuisance. They appointed a committee of their Board, (Dr. Pinkam was chairman) who examined and analyzed the water in the ponds of Montclair and Bloomfield. In their report, they state that the water in the Bloomfield ponds is far more impure than the water of the Montclair ponds (the water is so bad that there is no living fish or snake in it). The committee also recommended the factory owners to keep their refuse matter out of the stream. Do not think this has been done to any extent. The question arises, what can be done to abate this nuisance? We should be pleased to have the counsel of the State Board of Health, so that next summer we may be prepared to take some measures to abate this evil.

CALDWELL, - - - - C. M. HARRISON, *Caldwell.*

During the past year several cases of malarial fevers occurred on the line of a small stream flowing through the village of Caldwell. It was noticed that the waters on a small pond nearly in the center of the village were coated over with a peculiar growth of algæ. Mr. H. H. Rusby, a botanical expert, made an examination of this algæ under a magnifying power of four hundred diameters. He found nine species.

The existence of this algæ I took as being evidence of something more than a condition of stagnant water; for they had not been observed before. Of course no evil could result directly from these growths *per se*, but the contamination of the water proved that an evil was to be remedied. An examination of the stream above, showed that at one or two points, privies were located nearer the brook than they should have been, and that the overflow from cesspools on the grounds of the penitentiary, reached and poisoned the waters of the brook. At points in the stream, where the flow was very slug-

gish, the water was found to be swarming with animalculæ. The wastage from the cooking and washing rooms of the penitentiary for the past two years, has in unreasonable quantities, escaped into this brook, and no doubt the cases of malarial fever referred to can be directly traced to this source. Parties were notified, but the evils complained of have been mitigated only—not removed.

During the heated term in August of the present year, two cases of typhoid and several of malarial fever occurred at Newark City Home. This institution is beautifully located on a shelving portion of the eastern slope of the Second Mountain. The institution belongs to the city of Newark, and our local Board here refers to the matter only because the facts developed are pertinent to such a report as this. The examination was made by our secretary who was recently appointed to take charge of this institution. He found the plumbing exceedingly defective, and that portions of the building were infected with sewerage gases. The traps of the pipes were no where ventilated, and in some cases the pipes themselves were filled with noxious matter and unserviceable. Alderman Chas. Marsh, of the Trustees, took the matter in hand in an energetic and business like manner, changed the system of drainage throughout, and provided proper ventilators. The sanitary condition of the building is now, in most respects, excellent. It is worthy of note in this connection that the most malignant case of fever was developed in a young lad of fifteen years, whose bed was next adjoining a most defective water-closet. These facts are worthy of attention, because their study enforces truths which must be regarded in the construction of public dwellings.

The healthfulness of the township has been unusually good for the year past. The farmers have had no contagious diseases among their cattle or other stock. The so-called epizootic during the fall months, was of the lightest type, and produced no disarrangements among the teamsters. Chicken cholera has raged here and there, involving small losses, but, beyond this, we have nothing other to report.

With ample facilities for thorough drainage, Caldwell may place herself in an enviable position so far as a clean, pure and dry local atmosphere is concerned. Herein we have the first condition of general healthfulness.

CLINTON TOWNSHIP, - - D. S. SMITH, M. D., *Irvington.*

A communication from citizens, was made stating their grievances, arising from the sewerage deposits upon the meadow lands of the township, by the city of Newark, it being, in their opinion, health-destroying, through exhalations from such noxious materials, and praying this Sanitary Board to take cognizance of, and if possible, deliverance from the same. The communication was accepted, ordered on file, and a copy to be sent in the report to the State Board of Health.

At a meeting of the citizens residing in the southeastern portion of the township, holden this day, October 9th, 1880, at the house of Caleb Earl, for the purpose of deliberating upon the deleterious effects of the sewerage deposits upon the meadow land, by the city of Newark, and consulting together as to the propriety of taking action thereon, Mr. Henry Meeker was appointed chairman, and Dr. Isaac M. Wood, secretary of the meeting. After a full and free expression of opinion as to the health-destroying exhalations from such noxious materials, attested by the production of miasmatic disease through the neighborhood, as well as blasting (by the nauseating affluvia engendered) the character of this section of the township, so hindering its material prosperity, it was unanimously

Resolved, That the Chairman and Secretary be instructed to present in our behalf, our grievances to the Sanitary Board of the township, praying them to take cognizance of the same; and in if their wisdom, deliverance from it be possible, to interpose, in our behalf. With the request that our Secretary present this our appeal to the Sanitary Board, at their first meeting, duly signed by the officers of this meeting, the same was adjourned.

Several Freeholders appeared and presented complaints against three parties for receiving foul or noxious materials, and allowing the same to be deposited upon their lands. The Clerk of the Board was directed to serve notices upon the several parties (excepting the sewerage nuisance of Newark) demanding removal and discontinuance of the same.

LIVINGSTON TP., - - - S. H. BURNET, *Livingston.*

MILLBURN, - - - - A. J. R. SIMPSON, *Millburn.*

NEWARK, - - - - C. M. ZEH, M. D., *Newark.*

Report already given.

SOUTH ORANGE, - - A. M. RANSOM, M. D., *South Orange.*

The report notices the very low death rate.

WEST ORANGE, - T. MEREDITH MAXWELL, M. D., *Orange.*

GLOUCESTER COUNTY.

CLAYTON TP., - - - - T. S. TURNER, *Clayton.*

FRANKLIN TP., - - - - J. C. RICHMAN, *Malaga.*

The report notices the necessity of guarding against the illegal practice of unskilled or unprincipled practitioners.

GREENWICH TP., - - - JOHN STETSON, *Paulsboro.*

GLASSBORO, - - - - JOHN E. PIERCE, *Glassboro.*

The report refers to the successful action of the Board in correcting a slaughter house nuisance. Some cases of pleuro pneumonia occurred in this township. The intelligence of Local Boards, as to it, can be a great aid in its suppression.

MANTUA, - - - - B. A. CORSON, *Mantua.*

Four cases of small-pox occurred in the township, but all recovered. Prompt attention prevented the spread of the disease.

WEST DEPTFORD TP., - JAMES T. BUDD, *Woodbury.*

WOODBURY CITY, - - R. S. CLYMER, *Woodbury*.

A plan and survey of the whole city is about completed and a system of drainage and sewerage is to be adopted.

WOOLWICH TP., - - SAMUEL AVIS, *Swedesboro*.

HUDSON COUNTY.

This county, on account of its dense population, has a County Board. We are indebted to it for obtaining local reports and for securing a filling out of schedules. We this year only give the names of the corresponding officers.

HUDSON COUNTY, *Clerk of Board*, E. J. ROONEY, *Jersey City*.

BAYONNE, - - - H. MORTIMER BRUSH, M. D.

HARRISON.

A committee of Council is the Health Board.

HOBOKEN.

JERSEY CITY.

Board of Police Commission is Health Board.

KEARNY, - - S. W. CLASON, Chairman, *Arlington*.

NORTH BERGEN, - - A. ENGELBRECHT, *Homestead*.

TOWN OF UNION, - FRED C. HANSEN, Clerk, *Town of Union*.

UNION TP., - - - - WM. H. SCHMIDT.

WEST HOBOKEN, WM. G. SMITH, Health Insp'r, *West Hoboken*.

WEEHAWKEN TP., - - F. W. SHEERWOOD, *Hoboken.*

HUNTERDON COUNTY.

EAST AMWELL, - - B. C. YOUNG, M. D., *Ringoes.*

The report notices prevalent health, except some malarial disease, which is not usual.

FRANKLIN, - - CHAS. M. TRIMMER, *Quakertown.*

HIGH BRIDGE, - - JAMES H. WALKER, *High Bridge.*

Since its organization the Board has carefully looked after the health conditions of the township.

HOLLAND, - - - DR. J. T. RIBBLE, *Milford.*

The report notices the malarial fevers of an unusually severe type have been generally prevalent along the Delaware, the whole length of the river border. Our reports show that this has been true along nearly the whole course of this river—more we believe, than in any previous year. We believe it not very difficult to find what causes have been in operation to impede its waters, to effect adjacent drainage and to accumulate vegetable matter preparatory to dry hot seasons and unusual alternations of water covering.

KINGWOOD, - - WM. R. READING, M. D., *Baptisttown.*

LAMBERTVILLE, - - - - GEO. H. LARISON, M. D.

The Report deplores the neglect of vaccination and presents the need of more authority for health boards.

LEBANON TP., - - - - W. V. PRALL, *Changewater.*

In one of our towns there have been several cases of malarial and typhoid fever this summer. The supposition is that the

cause of it was that the cisterns on which railroad laborers and others depend do not get cleaned as they should be.

RARITAN TP., - - - DAVID DUNHAM, *Flemington.*

READINGTON, - - - - JOHN V. BERKAW, *Stanton.*

TEWKSBURY, - - - M. L. MCCREA, *New Germantown.*

TOWN OF CLINTON, - - - S. VAN SYCKLE, *Clinton.*

UNION TP., - - - - W. STOCKTON, *Pattenburgh.*

WEST AMWELL, - - JOHN T. DRAKE, *Lambertville.*

MERCER COUNTY.

CHAMBERSBURG, - - - EDW. B. SKELLINGER, *Clerk.*

The majority of property-owners have a pit dug in the yard adjacent to their houses, over which (pit) a water-closet or out-house is placed. Pipes leading from the house carry all the refuse water from this source into the pit, and it often happens that the plumbing is so defective, or of such a cheap character, that the stench arising from the contents of the pit will find its way through the pipe back, and contaminate every cubic foot of atmosphere breathed by the inmates of such house. Malarial fevers are quite common this fall, as well as during the past summer, and as a practitioner of medicine it has fallen to my lot to see several cases of the most malignant type, the exciting cause of which I attributed, (in a large degree,) to defective drainage.

The sanitary expenses of this borough are wonderfully small, the appropriation ($30) this year being the largest sum ever devoted to that branch of public service.

T WINDSOR, - - - A. A. WRIGHT, *Hightstown.*

he population outside of Hightstown is 1000.

HTSTOWN BOROUGH IN EAST WINDSOR TP., - -
W. W. SWETT, *Hightstown.*

Ialarial fevers have prevailed to an extraordinary extent, the
lity having been for many years entirely free from anything
he sort.

'he pond lying to the east of the north portion of the borough
enerally run quite low during the summer season, and is well
plied with the Yellow Pond Lily and much decayed vege-
le matter. The sewage from the Peddie Institute added to
ought at least to deter people from using ice from this
d.

ING TP., - - - - WM. H. COOLEY, *Trenton.*

t a subsequent meeting of the Board a petition was handed
to abate a nuisance known as Keeler's Mill Pond, said mill
d said to be the direct cause of a great deal of malaria.
enty-three (23) families out of twenty-five (25) have suffered
re or less all summer, all these families living on or near to
s pond. The Board have taken the matter in hand, and have
d two or three means to have it removed, but have not yet
ceeded. The fact of this disease being so prevalent all over
country has worked very much against us.

This township has also an effective sanitary association which
a good model for other towns and townships.

AMILTON TP., - - JOSEPH H. WEST, *Hamilton Square.*

OPEWELL TP., - - JOHN FLEMING, *Pennington.*

About the only epidemic that has prevailed since the Board
s organized, has been malaria, which has been very bad,
pecially in the western part of the township along the Del-
vare.

AWRENCE, - - JOHN P. SCUDDER, *Lawrenceville.*

PRINCETON BOROUGH, - WM. A. DURYEE, *Princeton.*

Our Board was chosen in early summer. It was scattered during our vacation period. A portion of the members, after a few weeks, declined to serve, and it is only within a few days (October 25,) that all the above members consented to serve. Still some good has been accomplished. Locations that need care are known; wells have been examined; some nuisances abated, and otherwise the Board now hopes to begin to do good work. The borough is districted, and committees appointed. It may be expected that we would include the college in this report, but so much has already been written—much true and much false—and the circumstances of the college sickness are so fully known to the officers of the State Board, that nothing further is said at present.

TRENTON, - J. D. WOOLVERTON, M. D., *President of Board.*

WASHINGTON TP., - JOSEPH HUTCHINSON, *Robbinsville.*

WEST WINDSOR, - JOSEPH H. GROVER, *Princeton Junction.*

There has been more malaria than usual. In this, and in very many of reports, the epizootic among horses is noticed. It is of interest, as showing how wide spread such an epidemic may be, and how independent of local influence in the fact of its existence. Also, as we compare it in severity with that of 1872–3, and compare climatic conditions, there is reason to believe that its mildness had much to do with weather conditions. There are some allusions to the fact that a mild influenza was at the same time prevalent among human kind.

MIDDLESEX COUNTY.

CRANBURY, - - - ABIJAH APPLEGATE, *Cranbury.*

EAST BRUNSWICK, - - RICHARD SERVISS, *South River.*

MONROE, - - CHAS. D. APPLEGATE, *Cranberry Station.*

NORTH BRUNSWICK, - JOHN W. BODINE, *Franklin Park.*

PISCATAWAY, - - - - NATHAN VARS, *Dunellen.*

The past year has been marked by an unusual amount of sickness. The extreme warmth of the winter of 1878-9, has had a marked effect upon the conditions of health of our township, and the inhabitants have been, as a consequence, exposed to a greater degree of sickness. Diseases caused by miasmatic influences have been more frequent than for many years. Intermittent and remittent fevers have been quite prevalent during the summer and fall, and a number of cases of typhoid fever, (which are rare indeed here,) have been observed.

In consequence of this miasmatic influence, other diseases seem to have partaken, to a certain extent, of the periodical character of intermittents, and the severe characteristics seem still to prevail.

These influences have been more general than local, although some local sources of disease have existed. I might mention, as such cause, our proximity to the mill pond at Bound Brook, which has had a very perceptible effect upon the health of our citizens residing in that immediate vicinity.

RARITAN, - - - - THEO. A. WOOD, *Metuchen.*

Public health has been generally good, except some malarial disease. The rate of mortality is less than for any year since the organization of the township. The Board of Health has done much to further the drainage of a brook through the village.

SAYERVILLE, - - - - E. E. HILLMAN, *Sayerville.*

SOUTH AMBOY, - - - A. APPLEGATE, *South Amboy.*

SOUTH BRUNSWICK, - - C. M. SLACK, M. D., *Dayton*

A typho-malarial fever accompanied by apthores sore mouth prevailed somewhat in the fall.

WOODBRIDGE, - - A. A. EDGAR, *Woodbridge.*

MONMOUTH COUNTY.

EATONTOWN, - - ABRAM T. METZER, *Eatontown.*

Malarial diseases have been unusually prevalent, assuming mostly an intermittent form. The only complaint of nuisance made to the Board was promptly attended to.

FREEHOLD TP., - - CHAS. F. RICHARDSON, *Freehold.*

Refuse and excreta are removed in a primitive way. Privies are located near the houses, and are cleansed when the owners or tenants please, except when complaint has been made to us, and we have ordered cleansing. Several complaints have been received which were investigated and remedied. * * A plan of sinks and odorless excavation should be adopted and enforced here. A careful meteorological summary accompanies the report.

HOWELL TP., - - - J. LUTZ, *Farmingdale.*

The township has always been remarkably free from malarial diseases.

MANALAPAN, - - JOHN VAN DOREN, *Manalpan.*

MATAWAN, - - - - - BENJ. GRIGGS, *Matawan.*

Malarial fevers have prevailed this year to an extent before unknown in this township.

MILLSTONE TP., - - - PETER FORMAN, *Manalapan.*

NEPTUNE TP., - - - *Report from Ocean Grove,*
DR. HENRY MITCHELL, *Ocean Grove.*

TO DR. E. M. HUNT, *Secretary State Board Health:*

In compliance with the requirement of Sec. 4, of "An act concerning the protection of the public health, and the record

of vital statistics relating thereto," approved March 11th, 1880, the Board of Health for the Borough of Asbury Park respectfully report:

The district over which this Board has supervision is located in Monmouth county, Neptune township. In form the territory of the borough is nearly a square. It is bordered on the north by Deal Lake, a tide-water inlet, about one hundred and fifty yards average width; on the west by the road bed of the Long Branch branch of the Central Railroad of New Jersey; on the south by Wesley Lake, and on the east by the Atlantic ocean. The ocean front is about one mile in length; the distance from the railroad to the sea is about three-fourths of a mile.

Ten years ago this district was literally a wilderness, being then covered by a dense growth of pine and oak, with an undergrowth of bushes through which a human being could scarcely pass unless aided by an ax.

At present the whole borough is laid out in streets, building-lots, parks, etc., and the permanent population, as shown by the recent census, is now sixteen hundred and forty (1640,) while the summer population, during the past season, reached fifteen thousand (15,000) during a period of three months.

The soil is sandy, with an underlying stratum of clay, about seven to fifteen feet beneath the surface. The clay bed is from three to seven feet in thickness, and is underlaid by a stratum of gravel. Below the gravel is another layer of clay, and the well pipes are driven through this second stratum.

The water taken from these wells has, thus far, been generally good, but several instances have come to our notice where wells have been contaminated, and a movement is now being made by the authorities to secure the introduction of water from a distant point. There appears good reason to expect that an abundant supply of pure water will be furnished to the people of the borough within the coming eight or nine months.

In contour the borough is nearly level, but there is sufficient unevenness of the surface to afford good drainage. There is a fall of four inches to one hundred feet from the railroad to the sea, and from the southern boundary to Deal Lake there is a fall of eight feet. Sewers have been laid (with ten inch tile) through First, Second, Third and Fourth avenues, and in Kingsly and Hick

streets, draining and taking sewage from about one-fourth or one-third of the most populous portion of the borough. A force of men is now at work extending the sewer system.

The streets are wide. All of the avenues leading to the sea are 100 feet wide, increasing to 200 feet toward the shore.

The parks in the borough are numerous, though but two of them are of large size, as the accompanying map will show.

The buildings are, for the most part, light frame structures, with ample piazzas, intended for summer occupation only, though within the last two years a better built and more permanent class of dwellings has been erected.

There is no difficulty in making good cellars in almost all parts of the town, and considerable care is manifested on the part of owners to promote health by cementing cellar bottoms, and also in ventilating incline spaces over unexcavated ground under dwellings.

The usual size of building lots is 50x150 feet, affording opportunity for free circulation of air.

Kerosene oil is chiefly used for obtaining artificial light, though the public buildings are generally lighted by gas, manufactured on the premises from gasoline.

Garbage and other house-refuse is collected daily by the borough carts, and deposited outside the corporation limits. This service was performed very satisfactorily during the past summer, few complaints of neglect having been received.

Privies are made in accordance with a borough ordinance which requires them to be made of brick—bottom and sides—and to be cemented on the inside and made water-tight. They are excavated by the odorless excavator.

There are no slaughter-houses nor any hog-pens within the borough.

The public school building is a large and fine edifice, erected three years ago at a cost of ten thousand dollars, exclusive of the ground. It has accommodation for five hundred pupils. The present attendance is about three hundred.

The only prison in the borough is the police station. It is kept scrupulously clean, and is suitable for the purpose for which it is used.

A new steam fire engine was recently purchased. This ap-

paratus, together with several carbonic acid fire extinguishers, seems to afford sufficient protection against fire.

There is no cemetery nor burial place within the borough.

The public health has been good during the past year. No epidemic, nor any prevailing disease has existed. Not a single case of typhoid fever has occurred here, to our knowledge, during the past year.

So far as we can learn, this locality is exempt from malarial influence. No form of malarial disease has ever been prevalent here, and we believe no case of intermittent fever has originated here. Intermittents and malarial neuralgias which are brought here yield readily to treatment. The Health Board has an Inspector.

SHREWSBURY TP., - - W. A. SICKLER, *Red Bank.*

RED BANK, (in the township), - H. J. CHILD, *Red Bank.*

Refuse is removed from vaults by a steam pump with tight barrels. The primary departments of schools are overcrowded. The Board, since its organization, has had sixteen complaints and served twenty-six notices. Through the request of the Board, some of the gutters have been flagged.

UPPER FREEHOLD TP., - - WM. ROBBINS, *Allentown.*

Allentown has special drainage in one street and first-class school provisions.

MANASQUAN, - - - - A. A. HIGGINS.

We have held several meetings but very few matters have been presented to us, excepting abatement of nuisances, in which few cases, the people have generally acquiesced in the suggestions of the Board. In this vicinity (on the ocean) there has been but one case of drowning, and in that no opportunity was afforded of applying means of resuscitation, as suggested by the State Board. There is an epidemic of diphtheria prevailing near Sea Plain, in this township, and at Ocean Beach, on south side of Stark River. Cannot account for it, except it be the

general prevalence of the disease at this season. Those attacked near Sea Plain live on the edge of a bog, which has been drained, and the water drank by them is principally surface water. There have been no other epidemics in this township during the year.

MORRIS COUNTY.

BOONTON, - - - - C. H. SIMONS, M. D.

TOWN OF BOONTON, - J. G. RYERSON, M. D., *Boonton.*

CHATHAM TP., - - MOSES M. OSBORN, *Madison.*

CHESTER TP., - - - W. A. GREEN, M. D., *Chester.*

No epidemics have visited us during the past year, though in the spring months we had a goodly number of cases of diptherite or diphtheria—for I regard them as one and the same, differing only in severity. We had also quite a number of cases of scarlatina of the mildest possible type, and in only three instances did anginose symptoms develop themselves to alarming extent. In one case we had nephritis as a complication, followed by anasarca. During the summer, we had comparatively few cases of cholera infantum. What few there were, with but a single exception, terminated in recovery; this was in an infant six months old. Ordinary diarrhœas were frequently met with and offered but little resistance to the ordinary methods of treatment. No well pronounced cases of dysentery occurred until the latter part of August, and this was of the variety known as bilious or malarial. It followed the course of Black river, near the swamp, all the way from Ironton to Hackleburne. All the cases recovered, and but little difficulty was experienced in bringing about convalescence. Fever of a malarial character has prevailed to no small degree; and in almost every disease that comes under our observation, we can discover a disposition to a paroxysmal exacerbation at some one time in the

twenty-four hours; this is generally controlled by a few doses of bark or some one of its alkaloids. This condition of affairs has grown more and more apparent for the last three or four years, prior to which time we scarce ever had occasion to administer bark as an anti-periodic. When it first began to develop itself, I attributed it in part to the unworked mines, (for at that time the mines were abandoned, owing to the general panic) and partly to the malarial wave, that seemed to be passing over a great portion of the country; perhaps both played an important part. When the mines were re-opened, last spring, the trouble seemed to augment, probably owing to the filth that was taken therefrom. Almost all cases of fever follow the several water-courses, or near them; on the hills we have a more varied class of diseases to contend with, mostly inflammatory in type. A great source of trouble is experienced in the Hackleburne district, in controlling certain diseases, particularly those of the bowels. This is accounted for by the location and surroundings: some dozen or fifteen houses, closely built together, occupied by miners, whose families are anything but neat in person or cleanly as regards the premises; all kitchen slops and waste, and very often chamber slops, too, are thrown in front of the door; the privies behind and above the houses, the water made foul by drainage, and the air impure by the water in the river and the uncared for cow-pens and pig-stys, all go toward rendering the locality one of the most unhealthy in the township. Much has been said and threats made about the place, but to no purpose, and the only thing left to do is to exercise the authority which is invested in this Board.

JEFFERSON, - - - SILAS & ROWLAND, *Milton.*

MENDHAM, - - - JOHN R. PITNEY, *Mendham.*

MONTVILLE, - - - JOHN BLOWERS, *Montville.*

MORRIS, - - - COLLINS WIER, *Morristown.*

MORRISTOWN, - - CHARLES H. GREEN, *Morristown.*

MT. OLIVE, - - - - ENOS G. BUDD.

The reports notice the excellent natural water-supply and the healthy character of the locality.

PASSAIC, - - OSCAR LINDSLEY, *Green Village*

The township includes the Great Swamp, consisting of about seven thousand acres. The health of the township has been good the past year.

PEQUANNACK, - - E. W. MARTIN, *Pompton Plains.*

The habit, when numbering the school district, of inquiring if the children are vaccinated, is a good one.

RANDOLPH TP.,

DOVER TP., - - - - WM. H. LAMBERT, *Dover.*

The town is on the Rockaway river and well supplied with water. The poor are few and are taken care of by the township.

ROCKAWAY, - - - - - - E. B. MOTT, *Rockaway.*

Malarial fevers are prevalent along the Rockaway river in summer, probably caused by the diversion of its water from its natural channel for canal or other purposes.

ROXBURY, - - - - J. T. LAWRENCE, *McCainesville.*

There has been considerable sickness from malarial fever. The Morris Canal has, of late, been quite thoroughly dredged, and the muck was thrown upon its banks and most of it has remained there. One case of nuisance was abated by the Board.

WASHINGTON TP. - - - B. LARUE, *Waughrightville.*

OCEAN COUNTY.

BERKLEY TP., - - - - C. F. BONNELL, *Bayville.*

JACKSON, - - - - THOMAS P. BISHOP, *Cassville.*

The assessor reports the district as always exempt from fevers.

LACY TP., - - THOS. C. VANARSDALE, *Cedar Creek.*

No ponds or stagnant water are to be found in any part of the township. There are no malarial fevers and deaths seldom occur.

PLUMSTEAD, - - - A. S. BROWN, *New Egypt.*

The description of the township, especially of New Egypt, is that of a healthy section. The pines extend upon the south, and these, and the excellent water-supply, seem to promote the good health of the locality. The water from the cedar swamps seems to be purer than the usual surface water.

PASSAIC COUNTY.

ACQUACKANONK TP., - - NICHOLAS FREDERICK, *Passaic.*

MANCHESTER TP., - - MR. DE GRAY, *Hawthorn.*

Chills and fever and remittent fever have been prevalent this year.

PASSAIC, - - - - JAMES A. NORTON, *Passaic.*

PATERSON, - - CHAS. F. W. MYERS, M. D., *Paterson.*

In addition to report are sent valuable specimens of various blanks used.

POMPTON, - - - CORNELIUS TOWNSEND, *Wanaque.*

Burial grounds are mostly connected with churches. The question may be properly raised whether churches that are closely crowded upon by graves or not occupied during the week, do not become the receptacles of grave-yard air, and so risk the health of those who assemble on the Sabbath. Since it has become more common to have basements, or to have furnaces in small cellars under the building, there is more risk of an inflow of air laden with organic matter.

WAYNE TP., - - - - - DAVID BENSON, *Paterson.*

There has been a good deal of malarial fever for the last two years. The effect of various feeds on cattle as producing disease is noticed. Corn meal, from which the sugar has been extracted, has somewhat taken the place of brewery grains. Aborting among cows is not now so common; this is an evil much complained of by farmers; it is an important inquiry whether diseased rye or other grains do not cause it.

WEST MILFORD, - - - A. S. TERHUNE, *West Milford.*

We quote from a letter appended by one of the physicians of the township.

During the past spring and summer there has been some dysentery, cholera morbus, &c., among the adults, and cholera infantum among children, but not in a fatal form. But the great affliction, or *curse*, if properly named, in West Milford and its environs, is malaria or chills and fever, intermittent fever, &c. It seems to be growing each year, increasing in area and assuming different types and shapes. There has been a number of cases of typhoid fever of a malarial type during the past two or three months, and some of them about sick enough to die, still I have heard of but one fatal case. What causes this malaria I am not entirely able to say, to my satisfaction, and I am quite sure I can't explain it to the satisfaction of all; I do not think it is caused by the badness of the people in West Milford. It is now prevalent to an alarming extent. Quinine cinchonidia, or some other antiperiodic, is a regular dessert for breakfast, dinner and

supper. Malaria around here enters into nearly every disease or complaint I have to deal with, even to child-bed, and I can't get through any of them without the use of quinine. I have been in this place over thirteen years, and for the first five years hardly a case of chills and fever was known any where around, but about eight years ago, when the Greenwood Lake and Montclair Railroad was commenced, intermittent fever, in its various forms, began; I ascribed it to the excessive throwing up of fresh earth, with its millions of little roots, &c., of vegetable matter rotting and decomposing, and throwing off a poisonous gas or fragrance of some kind. But eight years have past, and still the chills and fever, or malaria, is on the increase, and in parts of the community where the natural drainage is good, no swamps or marshes, and genuine mountain air, seemingly healthy and invigorating. The water in Greenwood Lake is very low, at present, owing to the fact that the Morris Canal Company has it under control, to a great extent, and can draw of the water to suit their convenience. A great quantity of vegetable matter is left to decompose, and the result is just what you can expect, a loathsome, disgustings mell all along the border of the pond, an odious gas of some kind or other, perhaps, or a malarial breeder. This, of course, is not at all times of the year, but it is so now, and seems to be the case whenever the Canal Company chooses to raise the water below the average water-mark. If nature had been let alone here, and not been tampered with by art, my impression is that malaria would hardly have been known around Greenwood Lake. The lake has been made larger by nearly two miles in length, land overflowed, a company made richer by it, and a neighborhood made sick. Cannot an act of legislation be made to keep the Canal Company within health limits? Will the State Board of Health of New Jersey take some action about it, find out if I am telling the truth, and if so, try, and not stop trying, till a remedy is found? Greenwood Lake is a pleasant, picturesque lake, surrounded by mountains, and is really a healthy place; air cool and bracing, and is destined, in time, to become quite a popular summer resort, if "not injured by man's device." I will say something also about public nuisances in this part of the country, and that will be about school-houses, privies and cemeteries, or country grave-yards. The public school privies are not well looked after by the trustees,

&c., and are allowed to become filled to the top of the ground with the excretions; no disinfectants, such as dry earth, coal dust, out of coal pit bottoms, are used, and the consequence is that a foul stench is emitted, disgusting and loathsome in every way. I believe that a privy, as a general thing, should be kept just as clean and sweet, to the eye and nose, as the teeth should be kept clean to preserve a good breath. I believe these bad kept privies of our country schools have a demoralizing effect on the children. Would it not be well for the Board of Health to tell the County Superintendents to speak to the teachers about this thing, when they are calling round among the schools under their charge? It wouldn't hurt our teachers, up this way, one bit, to have their County Superintendents ask if charcoal was made around here.

Another great nuisance in some parts of the country is the grave-yard, or burying-ground; such a one we have in the village of West Milford, in the shape of a grave-yard; this grave-yard is in the centre of the village, and on the elevated side of the street. The church is in the grave-yard. Private dwelling houses are situated on the lower side, or other side of the street. Each house has a well of water for family use, cooking and drinking purposes. What I mean is this, the water runs from the grave-yard in these wells, without doubt. I have heard one old sexton of this church tell me a number of times, that when graves were dug in certain parts of the yard, the wells of water would become roiled and muddled during the process of digging the graves. The children of the Sunday School drink out of these wells, and the children of the public school in the place patronize them, as the school has no well of its own, and if it had, the school-house is situated at the lower end of the grave-yard. This grave-yard is a confirmed nuisance; it is an old yard and the community still bury in it; the land is wet and soggy in the yard. There are a number of good locations within a quarter to a half mile from the village for a cemetery or grave-yard—soil dry and pleasant. I urge strongly on the State Board of Health, that the matter be looked into, and, if I am correct, that an act in the Legislature be passed preventing any more burials taking place in this grave-yard.

SALEM COUNTY.

LOWER ALLOWAY'S CREEK, W. B. RIDGWAY, *Hancock's Bridge.*

LOWER PENN'S NECK, - - WM. NEWELL, *Pennsville.*

QUINTON, - - - A. G. MCPHERSON, *Quinton.*

SALEM CITY, - - - - J. D. FERRELL, *Salem.*

Its Board of Health was late in organization, but is now fully organized.

UPPER PENN'S NECK, - - GEO. W. HEWITT, *Pennsgrove.*

Three other townships have Boards of Health, but have made no special report. The health of the county seems to have been remarkably good.

SOMERSET COUNTY.

BEDMINSTER, - - - WM. P. SUTPHEN, *Bedminster.*

A fever of remitting, intermitting and typhoid types has prevailed in the southern central portion of the township for a period of three months. The clearing of timber from a tract of land embracing about seventy acres has been in progress about four years; a portion of the timber was manufactured into charcoal, while much more was permitted to decay on the ground. During the coaling, the neighborhood was clear of fever; after that ceased, fever commenced in the vicinity, and upon the high lands adjacent. The land was low, in spots marshy from blind springs, and the soil a clay subsoil. During the latter part of the month of September, in 1880, the village of Pluckamin suffered from fever to a degree approaching an epidemic. Due notice having been given, the Board visited the village officially, on the fifth day of October. The sewerage, cellar drainage, condition of wells, cisterns, cesspools and privies were examined,

taking one day's research. Cases were found that demanded prompt action. Property owners were at once notified, requiring sewerage, cleansing of wells, cellars, privies, &c. In every instance, the Board are pleased to say, that their demands were complied with, and a general cleaning of the town was the result. Up to the date of this report no deaths have occurred in that vicinity from fever, and its force appears exhausted, as but few new cases in that vicinity are reported.

BRANCHBURG TP., - - A. J. AUTER, *North Branch.*

BRIDGEWATER TP., - - WM. J. POTTER, *Somerville.*

Chills and fever, or malarial fever, has prevailed in Bound Brook, so that scarcely a person in the village or vicinity has escaped. The Board of Health was called there in July last, to examine the condition of the mill-pond adjacent, and other places, to ascertain the cause of the unusual sickness. The Board met several times at the request of the citizens, and heard testimony in regard to the matter, and finally declared the mill-pond and dam a fruitful source of the disease seriously affecting the health and endangering the lives of the inhabitants of that vicinity, adjudged it a nuisance, and ordered the owners to abate and remove the said nuisance between the first and tenth of November; and that in case of failure to do so, the Board would proceed to remove the same, and charge the expense thereof on the lands. The parties had been previously indicted by the grand jury, and the case was tried in the courts before this time expired, the owners enjoined, and the court ordered them to abate the nuisance. They immediately removed the same by taking it all out to the foundation, and are preparing to drain the pond by making a channel through the central part with lateral drains on either side.

FRANKLIN TP., - - D. J. VOORHEES, *East Millstone.*

Malarial fevers prevailed to some extent. The Board took measures to secure full returns of vital statistics.

HILLSBOROUGH, - - - DR. C. R. P. FISHER, *Neshanic.*

MONTGOMERY, - - - WM. OPPIE, *Harlinger.*

Some cases of malarial fever are reported.

NORTH PLAINFIELD, - - ISAAC BROKARV, *Plainfield.*

It is claimed that the death rate is increased by the temporary residence of invalids.

WARREN TP., - - - GEO. TERRELL, *Warrenville.*

SUSSEX COUNTY.

ANDOVER, - - - - - G. C. COOK, *Andover.*

The great neglect of vaccination is noticed.

BYRON, - - C. K. DAVIDSON, M. D., *Starhope.*

Malarial affections prevail in the southern portions of the township.

FRANKFORD, - - EDWARD ROE, ASSESSOR, *Branchville.*

Land drainage is common and the water-supply good. Among animal diseases, foot-rot is noted as prevalent.

HARDYSTON, - - JESSE DENNIS, *Franklin Furnace.*

Malarial diseases were very prevalent during the summer and fall. Water is supplied from the Wallkill and Pequannock rivers and their branches, which are sluggish. Some of the tenement houses of operatives are in bad condition.

NEWTON, - - - - GEO. HENDEN, *Newton.*

Meteorological Tables are carefully kept at the Newton Library byDr. Ryerson under the direction of the State Board, and will serve to indicate the climate of this portion of the State.

SANDYSTON, - - - WARREN VAN SICKLE, *Layton.*

Scarlatina as an endemic existed to quite an extent last winter and in the early spring. During the summer and early fall, intermittent fevers were quite prevalent, caused, no doubt, by the extreme dry weather exposing decomposing vegetable matter.

SPARTA, - - - E. R. POTTER, M. D., *Ogdensburg.*

STILLWATER, - - - C. O. MOORE, M. D., *Stillwater.*

Malarial fevers, of the intermittent type, have been prevalent with quite a number of cases (mostly sporadic) of typhoid and typho-malarial fever.

VERNON TP., - - - CARLOS ALLEN, M. D., *Vernon.*

The Black Creek runs through the valley having extensive drained lands on either side. From these lands or from some other cause, unknown, there has been much malarial disease in the township of late years.

Drainage of wet lands (in other parts) has been effected to a great extent by owners, for agricultural purposes, which checked intermittents in the locality very much. A disease known as "Black Leg" has been reported among calves but is not contagious.

WANTAGE, - - - W. S. VONDERHOFF, *Deckertown.*

Malarial fever and ague have been common in the low lands along the Wallkill and to some extent throughout the township, induced, in my opinion, by long continued dry weather. In ordinary seasons it is unknown.

Abortion, or premature delivery of calves, causes great loss to our dairies.

UNION COUNTY.

CLARK TP. - - - - - W. H. COLES, *Rahway.*

Printed before as a sample of a brief summary.

ELIZABETH, - - - - PETER BONNETT, *Elizabeth.*

The city has a Health Inspector.

C. The water supply is abundant, and is drawn from the Elizabeth River, about a mile and a half from the populous part of the city. The Water Company's pipes are extended over a large part of the city. In other sections, good water is obtained from wells. Some complaint is made during the summer season of smell and discoloration in the city water. This is probably due to vegetable matter in the reservoir, and is a common annoyance in many places.

D. The sewer system is extensive and, in most parts of the city, in advance of the needs of the inhabitants. The only real defect is the use of the Elizabeth River as a drainage outlet, which in consequence becomes very foul and offensive and cannot, in that condition, fail to be detrimental to health.

FANNWOOD, - DR. F. W. WESCOTT, M. D, *Scotch Plains.*

LINDEN, - - - - C. J. BROWN, M. D., *Linden.*

Reference is made to the pollution and stench from Peach brook, which is substantiated by many persons, and seems to require the action of the Board.

NEW PROVIDENCE, - - JOHN WOOD, *New Providence.*

The Board reports some special investigations in the township.

PLAINFIELD, - - - H. H. LOWRIE, M. D.

The excavations known as the Gravel pits, which have been supposed to be the cause of disease for some years, have at last been filled and rendered perfectly healthy. Another source of complaint is a mill-pond, bounding the city on the west, which we hope to have remedied.

RAHWAY, - - - LEWIS S. HYER, *Rahway.*

The assessors take record of all not vaccinated. Some of the

physicians are dilatory in sending in returns of births. The introduction of water on the high pressure system does away with the necessity for fire engines.

SPRINGFIELD, - NICHOLAS C. JOBS, M. D., *Springfield.*

The diseases that prevail during the summer and winter are alike complicated with malarial poison so much that many yield alone to quinine, as, for instance, a bronchitis gets well under the influence of the bark better than when expectorants are relied upon. There have been only a few cases of scarlatina, and those of a mild type; a few of diphtheria; a lesser number of dysentery than in former years, while of the malarial forms, there have been frequent types of bilious or remittent, typho-malarial and congestive fevers. The pulmonary diseases, especially the forms of phthisis, are greatly aggravated and hastened in their course by the periodic and high fevers which the patients have, and which do not scarcely yield at all to any of the anti-febrile remedies. Those that ordinarily relieve the night-sweats do not have any effect unless combined with quinine. The public school is in good condition as regards the heating and ventilation. Were it not for "malaria," the people would be healthy, happy and prosperous.

SUMMIT, - - GEORGE W. NICHOLAS, *Summit.*

Malarial fevers of the intermittent form are slightly prevalent on the low lands. Hope to check the disease by enforcing sanitary regulations.

Evils have been arrested and the community has been awakened to the importance of guarding against disease by cleanliness both of person and dwellings.

UNION TP., - - - - JOHN LEONARD, *Union.*

Malarial fevers have been prevalent in many parts of the township.

The credit given in this report to the State Board for stamping out pleuro-pneumonia, depended much upon the efficient co-operation of the local Board of Health and of owners of cattle.

The extreme lowness of all streams during the summer is

noted. An effort has been made to convert a portion of the "Turf Meadows" near Connecticut Farms into a lake, but only a little progress has yet been made.

WESTFIELD, - - - - - JOHN M. C. MARSH.

The efficient action of the Board was important in checking small-pox in one locality.

WARREN COUNTY.

ALLAMUCHY, - - - - WM. SEALES, *Hackettstown.*

FRANKLIN, - - P. S. CLEVELING, M. D., *Broadway.*

General health good, but fowl and hog cholera have occasioned considerable loss of stock.

FRELINGHUYSEN TP., - T. RORBACH, M. D., *Johnsonbury.*

There has been unusual exemption from intermittent, remittent and other fevers.

GREENWICH, - - - S. W. WEIDER, *Reiglesville.*

The general health has been good. The losses from hog cholera are from five hundred to one thousand dollars.

HARDWICK, - - - J. S. VOSS, *Marlsboro.*

HARMONY, - - - I. K. VANNATTA, *Harmony.*

There are seven school-houses in the township, only one of which is a good one. Two are in cemeteries, and it is worthy of inquiry, whether such a locality is good. Cholera has largely prevailed among swine. It has been noticeable that farmers who lived on the hills were exempt.

KNOWLTON, - - - LEWIS C. WELLER, *Columbia.*

LOPATCONG, - - - J. YIESLEY, *Phillipsburg.*

PHILLIPSBURG, - - - - - J. P. SWEENY, *Phillipsburg.*

The Board of Health has found some difficulty in its work, but has pushed forward without fear or favor.

TOWN OF WASHINGTON, - WM. BAIRD, M. D., *Washington.*

Possibly one, if not the most important sanitary subject in our town, is the question of sewerage. Our town is particularly free from typhoid diseases and so called zymotic affections, whether this is due to the general use of cistern-water I am unable to say, but with good sewerage there is no reason why this town should not remain with a very small death rate. We are badly situated for getting a water-supply through pipes, and so cisterns will no doubt be used for a long time, or until the town increases materially in wealth and size. This fact, taken with its present size, makes the town well adapted to the earth closet system, and I believe if our townspeople were instructed through the State Board, or by pamphlets, as to the importance of this system, that dry earth and removals at regular intervals would take the place of foul vaults and cleansing every 4 or 5 years. The health of our town is not materially effected by these things as yet, but it is our duty to keep it in its present healthy state.

WASHINGTON TP., - - WM. C. CAMPBELL, *Washington.*

The reports include many more items of local and industrial interest, and as placed on file, will afford important reference as to most of the localities in the State. The faithfulness of observations and the general ability shown in these returns vindicate the present construction of our Health Boards. While there are some township officers who are not fully awake to the importance of this oversight of health, it is because they have not yet had time to become intelligent as to existing needs. Each year will increase local attention, except in those rare instances where there is opposition to all progress.

SUGGESTIONS TO HEALTH BOARDS.

In addition to other directions, to be found in this and other yearly reports of the State Board, it may be added:—

I. Let each Township Committee at its usual meetings, when the assessor is present, sit also as a Health Board and enter the fact in the township health book, together with any item of business.

II. Whenever new officers are elected, there should at the first meeting be an entry in the health book of the names of the Health Board as thus made.

III. Where there is no township physician as a member of the Board, some of the Boards have invited some adjoining physician to act as their adviser.

IV. Carefully examine all laws relating to the construction of local Boards and their duties. Correctness and promptness of action are most important. The failure of a law is oftener in delay or mistakes in its administration, or in technical errors than in the defects of the law.

V. The reports of the State Board of Health as sent are not the property of individuals but of the Board. The keeper of the town health book should keep control over them and see that when loaned to others they are returned to him, and passed over into the hands of the succeeding officer.

VI. We ask the same promptness in future annual reports as in these, and that the few who have failed to organize, or to make full report, will fully arrange at the first meeting of the Township Committee, and notify us.

VII. As the returns of marriages, births and deaths, so much indicate the progress and health of communities, and are essential in the study of local conditions, all Boards should insist upon prompt returns, and report to the Secretary of State any omissions. It is, too, the legal right of every citizen to have such a record. Any neglecting returns are liable to suit at law.

VIII. All communications should be addressed "State Board of Health," or "Bureau of State Vital Statistics," State House, Trenton.

TYPHUS FEVER.

BRIEF MEMORANDUM OF TYPHUS FEVER AS NOW PREVAILING IN CAMDEN COUNTY ALMS-HOUSE.

About the middle of January, after the Report of the Secretary had gone to press, a request was received by the Secretary of the Board from a Freeholder Committee of Camden county and from the physicians of the Alms-house, that the Board would give attention to a fever prevailing at that institution which had already caused sixteen deaths, but the character of which was not yet fully certified. Our first visit was made January 17th, and a preliminary report the day after. We abstract from that report as follows:

Between November 24 and the date of my visit, there had been about fifty cases of fever, with symptoms very distinct from remittent, and not having the usual symptons of typhoid fever. We sought the history of the first ten or twelve cases that had occurred. The first patient was living, and was able to give an intelligent account of himself immediately previous to his attack. He had been working during the summer at Ellisburg. About the fourth or fifth of November, he went to Philadelphia, where he remained about a week, with very indifferent self-care. He lodged in two mens' lodging houses, which he describes as of the lowest kind; the crowded rooms were occupied by about twenty others, and a few days after his return home, he became ill, and was brought in a semi-unconscious condition to the alms-house, November 24th, and placed in a small room about 12x12 with three other persons in it. On December 6th, one of his room-mates was taken sick with the same fever, and the other two soon after. In the next room on the left, occupied by two persons, both were taken sick. Cases soon followed in the two rooms on the opposite side, across an eight feet hall. The first ten or twelve cases were just in this section. In the two rooms adjacent, and the three rooms opposite very few escaped. Three of the patients, one of the nurses and some others were able to give numerous facts as to the progress of the disease. The disease had never showed itself in the women's department of the same building. Taking all these facts and some others, as well as the charac-

ter of the fever into consideration, it seems very probable that the occasion of the sickness was the introduction of a contagious disease in the person of the first patient. It was, however, important to examine into other possible sources, or to see whether a fever that had been thus introduced was rendered unusually severe by bad household or local condition. The details as to the examination of water-supply, sewer system, and all sanitary construction, will be given hereafter.

The great defect that at once expresses itself is that of overcrowding. In November and December, the new part not having been in full occupancy, and the number of inmates being greatly increased, there was also an increase of crowding. We found seventy men in two adjacent rooms, 20x80 and 20x70, respectively. The closeness of beds in dormitories and rooms is still worse. Those who are sick are now crowded into entirely too small spaces, and the nurse force is wholly insufficient. While the physicians are doing everything in their power, it is to be feared that the high rate of mortality will not be avoided, and occurrences of new cases prevented until a system is adopted just the same as is in operation in our best hospitals. There is danger that the disease may spread into the adjacent district, unless the greatest precautions are taken, or that the whole institution may become so infected, as to repeat the experience of some others which have continued to have new outbreaks from the old virus, through successive seasons. While more details will be given in the full report when made to the State Board of Health, it seems proper that in view of the present emergency this preliminary statement should be made.

Respectfully, EZRA M. HUNT,
Secretary of State Board of Health.

Continued correspondence urged the rapid adoption of a hospital and separative system. On account of imperfect discipline and doubts as to exercise of authority, some delay occurred. At my next visit I was accompanied by Prof. C. F. Brackett, President of the Board, and Dr. F. Gauntt, member of the Board from Burlington County. We all earnestly insisted that the fever was of so serious a character as to be regarded as a pest which might easily be extended through the adjoining district. The Freeholders were advised to give to the physicians full power of stewardship, and to perfect a system of quarantine by which all well patients after fourteen days could be removed. The rate of mortality had decreased after a little relief of the over-crowding and the use of disinfectants. To this date there have been about seventy cases and twenty-five deaths.

Post-mortems advised by the Board and conducted by Prof. Tyson, of Philadelphia, as also other examinations of specimens by Prof. Pepper, leave no doubt that the disease is typhus fever. *Our report next year* will contain fuller details of cases as also of a thorough examination into local conditions.

It seems a coincidence that remittent fever at Bound Brook, typhoid at Princeton, and typhus in Camden county, should have in one year furnished such wonderful fields for typical study, while small-pox as a contagious disease which can be prevented has also had too much sway. The occasion for a close investigation of preventible diseases seems thus greatly impressed upon us, while other still more common zymotic diseases invite our constant attention and care. These whole series of cases have fully impressed upon us the importance of preventing such outbreaks and the need of prompt sanitary methods in their abatement.

SUBSOIL DRAINAGE.

THE SANITARY REQUIREMENTS OF SUBSOIL DRAINAGE OF THE SITES OF TOWNS AND CITIES.

BY ASHBEL WELCH, C. E.

All we have to say rests on the proposition that *wet soil is unfavorable to health.* As this will hardly be disputed, we shall not attempt to prove it, but merely enumerate some of the injurious effects of wet soil.

In hot weather the moisture from it facilitates the development of disease germs or specific poisons, whatever disease germs or specific poisons may be, and also their transport from place to place. That moisture facilitates the evolution of deleterious gases. Even where there is nothing to decompose, it causes an injurious excess of vapor. In cold weather the evaporation from damp soil uses up some of the needed heat, making the ground, in some cases, ten degrees colder than it is found to be after being drained.

Dampness also makes the human body more sensitive both to heat and cold. In the dry climate of Minnesota many degrees below zero are quite bearable; on the other hand, we all have felt a temperature of eighty degrees harder to bear on a damp day, than one of ninety degrees is on a dry day. Breathing an atmosphere of vapor by skin and lungs, instead of all air, or nearly all air, has a depressing effect, tending to produce disease, or predispose to it. One reason why mountain air is so invigorating is that at night the atmosphere of vapor is tenuous in comparison with the air, and so we breathe more air and less vapor. The depressing effect of hot weather, and the invigorating effect of cold weather, are probably due more to the greater or less amount of vapor than to the direct effects of heat or cold.

Under some conditions, a wet soil helps to produce one great

class of diseases, such as malarious, and to spread and intensify the zymotic; under other conditions, it produces another great class, such as rheumatism and coughs and consumption.

Doubtless the recent wide extension of the practice of excessive watering of streets in hot weather, is one cause of the increased sickliness of many places, and especially of the spread of malaria to places where it never prevailed before. This comes not only from the moisture, but from the fumes of the street filth, which the moisture assists to solve. The evil is intensified by the excessive foliage in some places, especially close around dwellings. Some persons, perhaps many, on reaching a watered street on a hot day, are unmistakably sensible of its depressing effect. Dust is bad, but dampness and malaria are worse.

The driest countries in the world, such as Egypt and Algeria are the healthiest, except when the heat is excessive; and these far healthier than damp countries equally hot.

Offices in basements, and dwellings of the poor in cellars, even at Liverpool, are notoriously unhealthy. Cellar kitchens are saved from unhealthiness by their open fires.

As there is everywhere an atmosphere of at least very tenuous vapor, some amount of it is doubtless necessary to health and comfort. It is therefore conceivable that a place may be too dry. But it is not likely that a place will ever be found or made too dry in this country.

It may be said that the air in a hot stove room becomes so dry as to produce headache; and that in hot weather the moist air around a playing fountain is refreshing. The headache comes from other causes. The coolness produced by the evaporation of spouting water is refreshing to most persons, in spite of the increased moisture, but to some the depression from the moisture more than counterbalances the coolness.

In 1862 Dr. Henry L. Bowditch, of Boston, read a paper on the connection between moisture and consumption, before the Medical Society of Massachusetts, showing the comparison, after several years of observation and inquiry, of one hundred and eighty-three townships in that State, and also of many single localities and dwellings. He found that in the one hundred and twenty-eight localities where moisture prevailed, consumption prevailed in one hundred and thirteen, and was rare in fifteen and that in the sixty-two townships where dryness pre-

vailed, consumption prevailed in twelve, and rare in fifty. That is, it prevailed in eighty-eight per cent. of the wet localities. and in less than twenty per cent. of the dry.

Much the same result was afterwards independently arrived at by Dr. Buchanan in 1866. After a wide and cautious induction from examination of localities in the three southeastern counties of England, he sums up as follows: "Wetness of soil is a cause of phthisis to the population living upon it." His facts would justify a much stronger statement.

The Registrar General of Scotland, in his seventh annual report made about a dozen years ago, speaking of Dr. Bowditch's conclusions, says in confirmation, that in five of the largest towns in Scotland consumption is most rare where the soil is driest, and little more than half as frequent in the very driest as in the very wettest.

As we should expect from what has been said it has been found that impervious and retentive soils (undrained) are more unhealthy than porous soils; that flat ground and that in which there are undrained hollows are more unhealthy than sloping ground of the same materials; and that glacial drift, being less pervious, and having more isolated hollows, is likely to be more unhealthy than diluvial gravel or sand.

It does not necessarily follow from what we have said that the proximity of streams or ponds, if the water is pure, is specially injurious to health. The evaporation from wet soil is continually forming and keeping up an atmosphere of vapor of considerable density immediately around us, that from neighboring waters being diffused, becomes more tenuous before it reaches us. The vapor from subsoil water brings up impurities from the ground into our very presence, while that from pure water does not. Evaporation from the ground chills it under our very feet; that from streams cools only the water and the air at some distance. But more than all, when the ground is dry the air circulates in it, and neutralizes its impurities.

So, in the somewhat analogous care of houses, damp from recent contruction, it is well known that they are unhealthy and depressing, predisposing to diseases of the lungs, rheumatism and epidemics.

Probably no one will question the fact that a site, naturally wet, is made more healthy by being well drained. But the extent

of the improvement in health by drying the soil, is probably appreciated by but few.

In 1867, Dr. Buchanan made for the Privy Council of Great Britain, a detailed report of the sanitary improvements that had been made in twenty-four towns in England, or cities as we would call them, and of the death rates before and after those improvements were made. Among the many particular effects of the improvements which he points out in each of these towns, one is the drying produced by the improvements. In a little less than one-third of the cases he reports "much drying," in a little over one-third of the cases, "some drying," and in the remaining third "little or no drying," or some equivalent statement. The following table, compiled from his statements, shows the decrease after the improvements were made, of the general death rate, excluding deaths from cholera during these epidemics, the consumption death rate and the typhoid fever death rate. We have grouped the towns according to the amount of drying. Dr. Buchanan recognizes the beneficial effect of drying, especially in consumption, but he does not seem to have seen what this table shows, the great extent to which the decrease of death rate was owing to it.

From Dr. Buchanan's report: Decrease in death rate, excluding epidemic cholera, after sanitary improvements made about 1855.

Column 1, name of town; 2, amount of drying; 3, deaths in 10,000 before improvements; 4, deaths in 10,000 after improvements; 5, per cent. of decrease from all causes but cholera; 6, per cent. of decrease from all causes but phthisis; 7, per cent. of decrease from all causes but typhus; 8, from cholera.

1	2	3	4	5			6			7			8		
Salisbury	Much Drying, 6.	240⅗	219	9			49			75			194		
Ely		239	205½	14			47			56			22		
Banbury		234	205	12½			41			48			42		
Macclesfield		298	237	20			31			48			10		
Croyden		533	190	18½			17			63			50		
Cardiff		298	226	24			17			40			290		
Liecester	Some Drying, 10.	264	252		4½			32			48			11	
Rugby		191	186		2½			42			10				
Worthing		155	153					36			*23				
Newport		280	216		23			32			36			125	
Cheltenham		194	185		4½			26			37				
Bristol		245⅙	242		1½			22			33			94	
Dover		222	209		6			20			36			[illegible]	
Warwick		227	210		7½			19			52			10	
Merthyr		301	262		13			11			60			371	
Ashby		216	202½		9			*19			56				
Stratford	Little or no Drying, 8.	217	202			7			1			67			
Penzance		221	222						5			*6			
Bryn Mawr		263	232			11			*6			56			[illegible]
Morpeth		260	247			5			8			40			[illegible]
Chelmsford		196	215			*						*5			4
Penrith		253⅓	250						5			55			11
Carlisle		280½	261			7			*10			2			25
Alverick		233	247			*6			*20			36			[illegible]
[illegible]	24	5,762	5,276	98	71½	24	202	222	17	[illegible]	345	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]ges		240	220	16⅓	7⅛	3	22⅔	22½	2	[illegible]	34½	[illegible]	[illegible]	[illegible]	[illegible]

From the foregoing table it appears that the whole number of deaths from other causes than epidemic cholera, before the sanitary improvements, in the 24 towns averaged 240 per annum for every 10,000 inhabitants. The number of deaths from consumption averaged 33 per 10,000, and from typhoid fever 13. This leaves 194 deaths per annum per 10,000 from all other causes than cholera, consumption and typhoid fever. Or out of every 1,000 deaths from other causes than cholera, 137 were from consumption, 54 from typhoid fever, and 809 from other causes:

	Total.	Cons.	Typh.	Other.
Before improvements	1,000	137	54	809.
Decrease when "much drying"	163	46	30	87
"some drying"	71	30	19	22
"little or no drying"	30	....	16	14
Decrease per cent. when "much drying"	16.3	33⅗	55	10¾
"some drying"	7.1	22¾	34⅕	2¾
"little or no drying"	3	....	30½	1¾
Decrease due to "much drying"	133	46	14	73
Decrease independent of drying	30	....	16	14
Decrease per cent. due to "much drying"	13⅓	33⅓	24½	9
Decrease per cent. independent of drying	3	....	30½	1¾

It would seem fair to infer that the decrease in the general death rate due to "much drying" where that took place, averaged 13⅓ per cent.; to "some drying," where only that took place, 4 per cent.. and to all other causes together, 3 per cent.; that the decrease of the consumption death rate due to "much drying" averaged 33⅓ per cent.; to "some drying" 22 per cent.; and to all other causes together nothing: that the decrease in the typhoid fever death rate, due to "much drying" averaged 24½ per cent.; to "some drying" 3½ per cent.; and to other causes 30½ per cent; and that the decrease in the death rate from all other causes than cholera, consumption and typhoid fever due to "much drying" averaged 9 per cent., to "some drying" 1 per cent. and to all other causes 1¾ per cent.

Without claiming for these inferred proportions, exact numerical accuracy, or putting them to any extreme, we are fairly entitled to conclude that drying the soil had more influence in decreasing the general death rate than all other causes together. Tabulating and classifying according to any other kind of improvement, we fail to find anything approaching to the same uniformity or magnitude of result.

The decrease in the death rate from typhoid fever, apparently

due to "much drying," was only 45 per cent. of the whole, that from diarrhœa still less; while the whole decrease of consumption was due to it.

The tables show, as they ought to, that the diseases known to arise from other and special causes, are not so much affected by wetness of soil, though aggravated by it; and that consumption is produced mainly by it, as was already known. That is, the inferences from the tables, are, on those points, corroborated by existing knowledge, and therefore likely to be correct in other respects.

The deaths from cholera, during three epidemics, all occurring before the improvements were made, averaged 50 per cent. more in those towns where there was afterwards "much drying" and which were therefore, probably, wettest, than in those where there was only "some drying"; and 100 per cent. more than in those where there was afterwards "little drying" and therefore, probably, in some cases certainly, dry already. Looking at individual cases, however, we do not find the connection between cholera and wetness of soil so uniform as between the majority of diseases, especially consumption, and wetness of soil.

With very few exceptions, the decrease in the death rate in the particular cases, as well as the general average, was greater where there was "much drying" than in those cases where there was only "some drying"; and in those where there was "some drying" greater than those in which there was little or none. This approach to uniformity among so many cases excludes all suspicion of accidental coincidence.

The good done by the sanitary operations in those four and twenty English towns was, therefore, mainly, the drying effected. It is very possible that the sewers as carriers of sewerage, in some cases did more harm than good, the excess of harm being more than compensated by the good they did as drains.

And yet, in most cases, this drying of the subsoil was not the thing particularly aimed at. The sewers were to carry off sewage and storm-water, and where there was any standing water, but the subsoil drainage was merely accidental or incidental. If the good effected so largely by accident has been so great, we may hope it will be much greater when the means are adapted to that special end.

We shall now consider those means.

Sewers and drains are built for three purposes: to carry off sewage; to carry off storm and hydrant water; and to drain the subsoil. We shall confine our remarks almost entirely to drains for the last of these purposes.

Sewerage, if water-borne at all, may be carried off by separate pipes, or by the storm-water sewers, according to the circumstances of the place. But we advocate a separate system of drainage, where the soil is wet, to carry off the subsoil water, for the following reasons.

In most soils, especially in wet and retentive soils, it is necessary, in order to get them well dried, to have the drains much nearer together than the sewers or the sewage pipes need to be, or can be.

Sewers need not, and should not, be many feet below the surface, except when they cut through a rising undulation of the ground. Drains, on the contrary, should be fifteen feet or more below the surface, so as to dry the soil to at least that depth, and to keep the deepest cellars dry. The deeper they are, the farther each way they will drain and therefore the farther apart they may be.

Drains can commonly run by the shortest and steepest lines to the nearest outlet. The almost constant flow being moderate in quantity is easily taken care of almost anywhere. On the contrary, sewers to carry storm-water must run on more regular grades, along lines of streets, and to some point, sometimes quite distant, whence a large quantity of water can run off without doing harm. If they carry sewage they should also reach a point perhaps still more distant, where it can do no harm.

A sewer, or pipe carrying sewage, must be tight, or else the deleterious matters or gases will escape into, and contaminate the soil, or the water in it. The soil, should not, therefore, be drained *into* them. It may be drained under, or alongside of such sewers or pipes; but it rarely happens that they are deep enough, or frequent enough, or run in the best direction. A sewer, even if it carried only clean rain-water, should not be used to drain the soil; for if it is not tight the water will run out of the sewer into the ground after a rain, by the same openings by which the subsoil water runs into the sewer at other times. This would keep the height of the subsoil water fluctuating, which is injurious to health. Drains unconnected with the

sewers keep the subsoil water at a uniform level. Water from cellars may be safely drained into subsoil drains, but not into sewers.

Before considering the position and construction of drains, let us first see where the water to be removed comes from, and how it comes. It may fall in rain or snow on the site; or it may be discharged there from water-works, sometimes to an amount that may equal, or exceed the rain-water. Or the water may come from somewhere else, by overland flow, or by percolation under ground. The mode and extent of drainage requirements are affected by the permeability of the soil, the position and inclination of the water, the slope of the surface, and the proximity and character of higher ground, and a proper place for discharge. One cardinal principle of drainage is to intercept the water as early, and as near its source as possible. As much as possible of the rain and waste hydrant water should be carried off at once over the surface or through sewers, and not allowed to sink into the ground, unless careful observation should show that an occasional rain-water subsoil washing does more good by carrying off impurities than harm, by varying the water-level, and in other ways. Overflow water from adjacent territory should be intercepted by channels, sewers or dykes, on the frontier of the site, so as not to come upon, and soak into the soil. Overflow of streams passing through the site may be guarded against by dykes, or what is better, enlarging their channel, or giving the channel a better section. A channel twenty-five feet wide and sixteen feet deep, will discharge one-third more than one of the sectional area of four times the width, and one-quarter of the depth. The width remaining constant, the capacity of the channel may be increased one hundred per cent. by adding to the depth only sixty per cent. In some cases, this deepening has not been done, from the erroneous supposition that it was of no use to make the bottom of a channel deeper than the basin into which it discharges.

The percolation of water underground from neighboring territory should be intercepted before reaching the site, if possible. That is commonly cheaper and more thorough. Often the water can be cut and carried off by a single drain, while if it is diffused over the site it would require many. Outside of the town the way is clear to drain to the best advantage; in the town

streets run wrong for draining, and foundations, houses, gas and water-pipes are in the way, and grades may not suit. The sooner the water is drained off the less it gets into the soil and the less harm is does.

Where such neighboring territory can be controlled, much may be gained by underdraining it all over. In most cases there should be a thorough and deep drain along the frontier of the town site to cut off the underground flow. A vertical stratum of open gravel should extend from the surface of the ground down to the drain, so that the water on reaching it shall immediately drop down through it to the drain. In some cases a course of sheet piling or thin cement wall may be necessary to prevent the water from crossing over the drain and going further laterally.

When the underground flow is too deep to be cut off, the drains should be as near as possible to the places where it rises, and as deep as possible so that it shall not spread, or rise high enough to do harm.

Drains should be fifteen feet below the surface if possible. They may be small round or rectangular unmortered culverts of stone or brick, pipes of terra-cotta or cement, tiles, &c. In any case they must be open at the joints or elsewhere to receive the water, be surrounded by open gravel or something equivalent, to exclude earth or silt, and a vertical stratum of gravel, even if only a few inches thick, should extend from the drain to the surface of the ground. Without this latter precaution drains may cease to take off the water at all from the soil some feet above them, after the filling over them becomes consolidated.

In many cases after sewering, the death rate has at first decreased, and then, after a while, increased nearly to what it was before. That is, the accidental effect of the sewer was to drain the soil so long as the filling around it remained open and porous, but when the filling settled and became nearly or quite water-tight, the drainage along the outside of the sewer ceased, the soil became wet again, and the death rate increased.

Cellars and foundations of dwellings should be kept dry, for if the cellar is damp the house will be damp. Some of the means besides the general drying of the locality, are cement or asphaltum floor and cemented cellar walls, or, at least, external cement

or asphaltum plastering upon them. A cement or asphaltum layer upon or under the surface of the ground, all around the house, to prevent the surface-water from running down to the foundation; and subsoil drains all around the foundations, and when necessary under the floor. Where possible, water should not be drained out of the cellars but kept out, not dried but kept from getting wet.

There should be no communication between cellars and sewers or sewage pipes. The poison given from them contaminates even ice. Separate drains are sometimes made on or alongside of sewers or pipes. It would be better to make them several feet below, and fill with gravel between.

It is quite possible that the uses for which sewers were intended, may, in some cases, have been productive of more harm than good, while their accidental effects were so great as turn the scale the other way, in favor of good. Streams of filth running for miles and miles through the sewers all over a city, pouring their poisonous gases through the openings into the streets, through the "modern conveniences" into the bed rooms, and through the kitchen sinks into the larders, may be worse than the evils they are intended to remove; but the accidental good they have done in those cases by draining the subsoil, at least while the filling around them remained porous, seems to have more than compensated for the harm. Now if this has anywhere been the case, it would have been a great deal better, as well as cheaper, to put subsoil drains there instead of sewers for sewage. Probably the improvement in many a sewered town is not due to sewerage, but to drainage; however this may be, there is no doubt about the great benefit of subsoil drainage, unless the ground is dry already.

METEOROLOGICAL TABLES.

Minimum, Maximum and Mean Temperature, at Newark, N. J., by Wm. A. Whitehead, for Years 1844 *to* 1880, *inclusive.*

YEARS.	MIN. TEMP.		MAX. TEMP.		MEAN TEMP. Each Five Years.	
1844	January 12,	3¾ degrees.	July 14,	92½ degrees.	51.21 degrees.	
1845	February 10,	3½ degrees.	July 14,	98¼ degrees.	51.37 degrees.	
1846	February 27,	1½ degrees.	July 10,	94 degrees.	51.66 degrees.	
1847	February 24,	0½ degrees.	July 19,	93½ degrees.	49.83 degrees.	
1848	January 11,	....	June 16,	94½ degrees.	51.25 degrees.	—51.06 degrees.
1849	January 11,	2¾ degrees.	July 13,	99¾ degrees.	50.89 degrees.	
1850	March 4,	9¾ degrees.	July 25,	93½ degrees.	52.86 degrees.	
1851	December 27,	7½ degrees.	June 20,	93¼ degrees.	51.76 degrees.	
1852	January 20,	2½ degrees.	June 16,	95¼ degrees.	50.57 degrees.	
1853	January 28,	6¾ degrees.	June 21,	97 degrees.	52.75 degrees.	—51.77 degrees.
1854	December 20,	2 degrees.	August 23,	99 degrees.	51.35 degrees.	
1855	February 7,	8 degrees.	June 29,	96½ degrees.	50.68 degrees.	
1856	January 9,	7¼ degrees.	July 27,	97 degrees.	48.95 degrees.	
1857	January 24,	12 degrees.	August 14,	89 degrees.	49.95 degrees.	
1858	February 24,	6¼ degrees.	July 11,	91½ degrees.	50.52 degrees.	—50.29 degrees.
1859	January 11,	12½ degrees.	July 13,	91½ degrees.	50.11 degrees.	
1860	February 2,	4 degrees.	June 29,	90 degrees.	50.00 degrees.	
1861	February 8,	7½ degrees.	July 9,	91½ degrees.	50.79 degrees.	
1862	December 21,	5 degrees.	August 9,	90¼ degrees.	50.68 degrees.	
1863	February 5,	3 degrees.	August 3,	90¾ degrees.	50.30 degrees.	—50.37 degrees.
1864	February 18,	2 degrees.	June 26,	94½ degrees.	51.04 degrees.	
1865	February 12,	1 degree.	July 7,	91½ degrees.	51.76 degrees.	
1866	January 8,	12¾ degrees.	July 17,	98½ degrees.	50.65 degrees.	
1867	January 20,	½ degree.	July 4,	88 degrees.	49.67 degrees.	
1868	February 4th,	4½ degrees.	July 5,	92 degrees.	48.62 degrees.	—50.35 degrees.
1869	March 1,	6 degrees.	July 16,	91¾ degrees.	50.40 degrees.	
1870	December 30,	5¾ degrees.	June 28,	92½ degrees.	52.67 degrees.	
1871	December 21,	1½ degrees.	May 30,	87¾ degrees.	50.46 degrees.	
1872	December 25,	2 degrees.	July 2,	94 degrees.	50.44 degrees.	
1873	January 12,	12 degrees.	July 3,	91½ degrees.	49.34 degrees.	—50.66 degrees.
1874	February 2,	3¼ degrees.	June 29,	91 degrees.	50.41 degrees.	
1875	January 19,	3 degrees.	June 25,	92 degrees.	48.20 degrees.	
1876	December 10,	4 degrees.	July 9,	98 degrees.	51.23 degrees.	
1877	January 6,	7½ degrees.	July 26,	99 degrees.	53.21 degrees.	
1878	February 4,	8 degrees.	July 3,	98¼ degrees.	53.63 degrees.	—51.34 degrees.
1879	January 3,	2 degrees.	July 16,	99¼ degrees.	51.75 degrees.	
1880	December 30,	6½ degrees.	May 25,	96 degrees.	52.92 degrees.	
Mean of the 37 years					**50.92 degrees.**	

From the foregoing table, the following facts are ascertained:

1st. That the lowest temperature has been experienced in February, thirteen times occurring, on nine of them between the 2d and 10th; in January, fourteen times, occurring on nine of them between the 3d and 12th; in December, eight times, occurring only once before the 20th, and in March twice, on the 1st and 4th.

2d. That the warmest weather is most likely to occur in July, having been experienced in that month twenty-one times, on

thirteen of them prior to the 15th; the next in number was June, ten times; then August, four times, and May twice, on 25th and 30th.

3d. That the extremes of temperature during the thirty-seven years was 112½ degrees; from 12¾ degrees below zero in January, 1866, and 99¾ degrees above in 1849.

4th. That the mean temperature of the years for the whole period was 50.92°; the coldest year being 1875, having a mean temperature of 48.20°, the warmest 1878, having a mean temperature of 53.63°.

5th. That such is the natural tendency to equalization in the course of years, that while the several years have differed nearly five and a half degrees (5.43°), yet between any series of five years, the greatest difference has been less than a degree and a half (1.42).

Highest and Lowest and Mean Temperature of the Several Months.

MONTHS.	HIGHEST TEMP.	LOWEST TEMP.	MEAN OF ALL.
January	1876—65 degrees.	1866—12¾ degrees.	37 years, 29.11 degrees.
February	1874—68½ degrees.	1855—8 degrees.	37 years, 33.17 degrees.
March	1851—77¼ degrees.	1868—2 degrees.	37 years, 37.79 degrees.
April	1846—85½ degrees.	1857—17 degrees.	37 years, 48.71 degrees.
May	1880—96 degrees.	1861—31 degrees.	38 years, 59.19 degrees.
June	1853—97 degrees.	1843—38¼ degrees.	38 years, 68.50 degrees.
July	1849—99¾ degrees.	1845—46¼ degrees.	38 years, 73.81 degrees.
August	1854—99 degrees.	1854—46¾ degrees.	38 years, 71.56 degrees.
September	1854—93¾ degrees.	1848—34½ degrees.	38 years, 64.11 degrees.
October	1861—83 degrees.	1845—22¼ degrees.	38 years, 52.99 degrees.
November	1847—73¾ degrees.	1875—8 degrees.	38 years, 42.38 degrees.
December	1848—68½ degrees.	1852—7½ degrees.	38 years, 32.01 degrees.
Mean			51.11 degrees

Temperature of the Seasons.

SEASONS.	WARMEST.	COOLEST.	MEAN.
Spring	1880—52.34 degrees.	1875—45.13 degrees.	37 years, 48.56 degrees.
Summer	1877—75.34 degrees.	1859—68.12 degrees.	38 years, 71.40 degrees.
Autumn	1850—56.32 degrees.	1875—50.77 degrees.	38 years, 53.16 degrees.
Winter	1879-80—35.91 degrees.	1867-8—24.89 degrees.	37 years, 30.59 degrees.
Mean			50.93 degrees.

The proportionate amount of fair weather during the several years, and the number of days on which rain fell in mensurable quantities, and snow irrespective of quantity in each year:

YEARS.	FAIR. Equal to Days.	Mean of each 5 years.	RAIN. In Days.	Mean of each 5 years.	SNOW. In Days.	Mean of each 5 years.
1844	222		101		23	
1845	238		88		24	
1846	209		98		23	
1847	219		91		31	
1848	233	224	91	94	23	25
1849	214		95		22	
1850	224		97		28	
1851	232		91		18	
1852	233		90		28	
1853	236	227	98	94	21	23
1854	230		79		34	
1855	220		94		22	
1856	253		79		23	
1857	219		101		32	
1858	235	231	98	90	19	26
1859	220		90		28	
1860	227		79		28	
1861	236		86		34	
1862	218		99		29	
1863	213	223	118	93	27	29
1864	239		82		28	
1865	228		85		26	
1866	228		97		24	
1867	213		101		37	
1868	204	222	101	93	36	30
1869	228		112		38	
1870	230		88		27	
1871	227		98		27	
1872	243		86		31	
1873	232	232	97	96	35	32
1874	239		92		28	
1875	219		102		44	
1876	216		96		31	
1877	228		98		13	
1878	219	224	110	100	18	27
1879	204		112		44	
1880	218		116		28	
Means	226	....	97	....	29	....

From the foregoing table it is seen that the amount of fair weather in any one year is, on an average, equal to 226 days. That the average number on which rain falls in quantities susceptible of measurement is 97. That snow is observed on an average 29 days in each year, and that on taking the average of each five years it will be found that the quantities assimilate in a remarkable degree.

Table of Rain-fall at Newark for Thirty-eight Years.

YEAR.	January.	February	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Average of each 5 years.
1843	....	....	....	....	0.850	1.590	2.285	*22.485	3.610	5.905	3.920	4.145	....	....
1844	4.985	1.640	4.785	0.390	3.550	2.560	5.820	2.080	2.970	5.515	2.040	3.875	40.210	....
1845	3.370	4.210	3.765	1.275	2.155	3.400	2.175	4.800	2.455	2.255	2.875	3.735	36.470	....
1846	5.125	4.160	3.415	3.265	8.745	2.175	4.730	4.105	0.550	2.815	8.745	3.745	51.575	....
1847	4.655	6.075	4.145	0.850	3.155	6.250	3.305	2.890	11.300	3.460	2.840	5.910	54.835	....
1848	1.825	1.815	2.395	1.335	5.985	6.005	2.065	0.955	2.195	4.965	2.720	4.520	36.780	43.974
1849	0.640	2.690	4.855	0.910	4.235	1.090	2.365	8.085	1.600	6.930	2.180	4.470	40.050	....
1850	5.010	3.055	4.175	3.030	7.435	3.535	7.420	4.725	4.405	1.725	1.520	5.110	51.145	....
1851	2.010	4.500	3.967	6.090	3.930	1.105	6.435	1.520	0.625	3.660	4.610	1.930	40.382	....
1852	2.920	2.205	4.805	5.215	2.675	1.720	2.535	4.165	1.740	2.170	5.845	7.545	43.540	....
1853	3.090	5.220	3.145	3.015	4.675	3.655	3.250	11.225	5.090	5.080	3.670	1.285	52.840	45.491
1854	1.790	5.020	0.960	11.365	4.170	2.100	3.580	1.125	3.960	2.440	4.310	2.635	43.475	....
1855	4.030	3.466	1.875	2.470	2.365	4.525	4.470	4.160	2.250	5.260	2.890	6.500	44.261	....
1856	3.370	1.250	2.000	2.570	4.315	3.120	1.410	5.700	2.665	1.400	2.790	3.485	34.075	....
1857	3.830	1.500	1.990	7.155	6.030	5.345	5.080	4.015	3.810	3.955	0.870	5.785	49.365	....
1858	3.405	2.495	1.010	3.852	4.995	4.650	2.995	4.210	1.410	3.010	4.785	4.260	41.077	42.451
1859	6.055	3.800	6.885	5.305	2.250	3.945	4.025	6.265	6.965	2.550	3.785	5.200	57.050	....
1860	2.320	2.710	1.225	2.510	5.000	1.815	2.720	6.235	5.650	2.835	6.715	3.420	43.155	....
1861	4.465	1.885	4.915	4.920	5.190	2.600	1.120	3.970	3.260	2.865	6.425	1.990	43.605	....
1862	5.415	3.695	3.995	3.215	3.045	6.605	3.020	3.005	2.125	4.265	4.455	1.850	44.690	....
1863	4.270	4.250	5.250	5.835	4.490	1.045	5.955	4.975	1.300	3.445	2.610	4.575	48.000	47.300
1864	1.730	0.825	3.145	3.670	5.280	1.855	2.675	3.210	4.680	2.675	3.950	4.760	38.455	....
1865	4.090	4.570	4.890	3.340	5.730	3.485	6.735	3.935	3.210	4.685	3.300	4.385	52.355	....
1866	1.740	5.070	1.820	2.820	4.400	2.505	1.840	5.345	5.470	3.970	2.090	2.910	39.980	....
1867	1.610	5.640	4.395	2.575	6.550	9.745	3.755	10.615	1.235	4.620	1.945	2.045	54.730	....
1868	3.275	1.620	2.170	5.255	6.925	5.895	8.535	4.755	8.955	1.250	4.375	3.845	56.855	48.473
1869	3.420	5.055	4.670	1.150	4.670	5.845	3.690	1.555	2.540	6.820	3.085	5.435	47.935	....
1870	4.725	4.265	4.555	7.000	1.995	3.125	6.965	3.095	2.795	4.750	2.460	2.185	47.915	....
1871	3.035	3.045	4.990	3.685	3.950	7.105	4.140	5.310	1.990	6.026	3.990	2.175	49.441	....
1872	1.845	1.775	3.880	3.745	3.075	4.270	8.940	6.625	3.240	3.110	4.175	3.785	48.465	....
1873	5.820	3.885	2.760	5.835	3.755	1.715	6.615	7.765	3.550	3.740	4.670	2.470	52.580	49.257
1874	5.670	3.168	2.135	8.715	2.755	3.580	4.230	2.785	9.050	2.435	2.860	2.810	50.193	....
1875	3.310	2.400	3.820	3.135	1.595	2.335	5.985	10.215	1.930	2.870	4.360	2.610	44.565	....
1876	1.200	5.355	10.000	3.305	3.045	1.585	3.060	2.450	7.505	1.260	4.040	2.515	45.320	....
1877	3.060	1.650	6.075	3.125	1.010	4.170	5.980	7.730	1.470	7.785	6.915	0.920	49.840	....
1878	6.525	4.960	3.635	1.730	4.205	2.445	4.330	8.060	2.535	2.830	4.570	7.469	53.294	48.642
1879	2.890	2.530	3.745	4.960	2.175	3.038	5.050	9.120	3.950	0.320	1.940	5.330	44.648	....
1880	2.590	2.830	4.900	3.305	0.760	1.185	7.460	4.680	2.480	2.100	2.365	2.685	37.340	....
Means	37 years 3.489	37 years 3.358	37 years 3.815	37 years 3.830	38 years 3.979	38 years 3.493	38 years 4.388	38 years 5.472	38 years 3.586	38 years 3.624	38 years 3.729	38 years 3.737	37 years 46.216	....
Greatest	6.525	6.075	10.000	11.365	8.745	9.745	8.940	22.485	11.300	7.735	8.745	7.545	57.050	....
Least	0.640	0.825	0.980	0.390	0.760	1.045	1.120	0.955	0.550	0.320	0.870	0.920	34.075	....

*Very remarkable—perhaps unprecedented.

Seasons.

	Spring Months.	Summer Months.	Autumn Months.	Winter Months.
Greatest quantity in any one year	1854, 16.515	1843, 26.360	1847, 17.600	1852-3, 15.855
Least quantity in any one year	1855, 6.710	1854, 6.805	1879, 6.050	1871-2. 5.795
Mean quantity	37 yrs, 11.709	38 yrs, 13.353	38 yrs, 10.989	37 yrs, 10.675

From the foregoing table it will be seen that the yearly average of water deposited in rain and melted snow is 46.216 inches, the extremes being 57.050 inches as in 1859, and 34.075 inches as in 1856. It is also seen that while two years in conjunction may differ in quantity 18.055 inches, as in 1847 and

1848, yet the greatest difference in the average of any five years was only 4.849 inches as in 1854–58 and 1859–63. One practical result derived from this table is, that in every square foot of surface in Newark, there falls on an average twenty-eight and eight-tenths gallons of water in the course of a year.

Depth of Snow in each Winter.

	Feet.	Inches.		Feet.	Inches.		Feet.	Inches.
1843-4	2	7	1856-7	4	4	1869-70	1	6
1844-5	3	3	1857-8	2	4	1870-1	3	1
1845-6	4	4	1858-9	3	11	1871-2	1	4
1846-7	4	...	1859-60	4	3	1872-3	5	3
1847-8	1	10	1860-1	4	...	1873-4	3	...
1848-9	3	9	1861-2	4	4	1874-5	3	7
1849-50	2	7	1862-3	4	2	1875-6	1	...
1850-1	2	1	1863-4	1	10	1876-7	2	11
1851-2	5	3	1864-5	4	...	1877-8	1	2
1852-3	2	1	1865-6	2	11	1878-9	2	11
1853-4	5	11	1866-7	5	2	1879-80	7	...
1854-5	3	9	1867-8	6	3			
1855-6	5	5	1868-9	1	10			
Greatest Fall 1867-8							6 ft.	3 in.
Least Fall 1875-6							1 ft.	... in.
Mean							3 ft.	6 in

METEOROLOGICAL SUMMARY AT PATERSON FOR THE YEAR 1880, BY J. S. HILTON, C. E., CITY SURVEYOR.

The total rain-fall for the year is largely in excess of the mean yearly fall recorded for a period covering nearly half a century. "Draper's" table of rain-falls, running back to 1834, gives 46.75 inches as the mean yearly fall for that series of years. Last year's fall amounts to 57.77 inches, an excess of 11.02 inches over the mean fall of 46 years. Of this total amount, 3.69 inches is due to melted snow, from an aggregate snow-fall of 44.75 inches in depth during the year.

Taking the amount of rain belonging to each season of the year, and comparing it with the mean fall for such seasons, we are enabled to compile the following table:

SEASONS.	Rain-fall for 1880.	Mean Fall.
Winter	13.79 inches.	10.47 inches.
Spring	8.06 "	12.44 "
Summer	22.34 "	12.45 "
Autumn	13.58 "	11.38 "

Here we find all the seasons in excess this year except spring, which fell short 4.38 inches, or about 33 per cent. of the mean. It is apparently rather an anomalous condition of things, to find a year with an aggregate rain-fall largely in excess of the mean fall of half a century, bringing with it a drought so widespread and severe as that of 1880. But in looking over the record an explanation is easily found. Taking the months of May and June, which show the heaviest mean rain-falls, with the exception of August, we find the year 1880 recording for them both but 3.75 inches against a mean fall of 8.60 inches, a deficiency of 4.78 inches, or nearly 60 per cent. This is the record for Paterson. At Newark and New York, the deficiency is still greater, the former place recording a falling off of 6.77 inches and the latter of 6.52 inches for the same months. We find further, that during May, 1880, there was but one day, and in June only three days, on which rain, otherwise than a mere sprinkling, fell.

This gives a period of 61 days, with only four days on which rain of any account fell. To this most unusual scarcity of rain, at the very period in which nature usually provides most bountifully for the saturation of the water-sheds and replenishing of the water-courses, was added a very high temperature for both months, and the prevalence of drying winds from the southwest, west and northwest. In these facts we can readily find sufficient causes for the severe drought, from which we are even yet not free, notwithstanding the large aggregate amount of rain for the year. During the year the greatest amount of snow fell in the months of March and December, it being 14 inches in each month. The least snow was in January, 3 inches. The heaviest monthly rain fell in July, amounting to 12.06; the least in May, 0.85 inches. The longest period without rain was 22 days, from the 31st of April to 21st of May (inclusive.) During the year rain fell in measurable quantities on 115 days. During 1879

rain fell on 114 days. The mean temperature for the year was 55°, 5° above the average. The temperature of the winter months was 37°, nearly 7° above the average. The spring months were 6° above the average, and the summer and autumn months, 6° and 1° respectively above the average. This record shows an unusually high temperature for the past year. The river was unusually low during the whole year. The highest water recorded for the year was on the 14th of February, it being then 3 feet 10 inches above extreme low water. On the 15th of March it was only 1½ feet above extreme low water level, and on April 28th it was barely 10 inches above extreme low water at the Arch street bridge. In April, 1879, it was 5 feet 10 inches above low water at the same point. From May to the end of the year the highest level reached was only 1 foot 8 inches above extreme low water,—and the rise was only temporary, the water rapidly falling after each rise, and from May to the end of the year it approximated but a few inches above extreme low water, the rains having little effect on it. The remarkably heavy rain of July, amounting to 12.06 inches, raised it but one foot above extreme low water. There is no record to show that the Passaic river has ever been at so low a stage of water continuously as during the year 1880. Since May there has been no time during any month when the average level has been more than one foot above extreme low water, below the Falls, and that only for a few days.

In fact, the drought, in duration, may be stated as one lasting eight months, and a drought of that extent may be safely recorded as having never been equalled, at least within the memory of the "oldest inhabitant." During 1878 and 1879, the low water in the river lasted only twenty-five days in the former, and forty-four days in the latter year. Against these periods, a drought of two hundred and forty days for 1880 is remarkable, and the drought of 1880 bids fairly now to extend into 1881. The rain fall of December, 1880, is far below the record for the last two years, and is 1.50 inches below the mean fall for the month. The stage of the river at present is but a few inches above extreme low water.

In 1878, the river in December was ten feet above low water, and in 1879 it was nearly three feet above. Never since the incorporation of the Passaic Water Company has its capacity

been so tried as during this year. Since May, their turbine has been used only a few days, and the steam pumps have been working continually night and day. During October, the water in the river and reservoirs was so low that, by agreement, the manufacturing establishments along the race-ways stopped work for one day (the 12th) to allow the river to fill up, and give the Passaic Water Company a chance to fill up their reservoirs. Thousands of dollars have been lost to these establishments during the year, in the enforced short time and stoppages, caused by the scarcity of water.

City Surveyor's Office, City Hall, January 5, 1881.

Table of Temperature and Rainfall at Freehold, N. J., from July 1st, 1879 to July 1st, 1880.

MONTHS.	Minimum Temperature.		Maximum Temperature.		Monthly Mean Temperature.	Rain or snow fell on days.	Total Rain-fall or melted snow.	Mean do. of five years.	Mean relative humidity.	Prevailing winds.	Thunder and lightning on days.
	Date.	Degree.	Date.	Degree.			Inches.	Inches.	Per c't.		
July	1 and 6	56.	16	97.	73.76	10	5.45	4.91	78.3	W.	10
August	10	51.	3	92.5	70.853	10	9.58	6.59	83.4	W.	5
September	26	37.	1	85.	61.44	8	1.86	2.92	80.2	W.	6
October	26	24.5	3	83.	58.49	9	0.68	2.85	79.6	W.	2
November	21	15.5	12	72.	41.498	7	1.71	4.40	74.2	W.	1
December	27	8.	4	60.	36.71	12	6.77	3.82	80.3	N.W.	—
1880. January	14	11.	28	58.5	38.183	11	2.06	3.03	81.4	W.	1
February	2	9.	27	67.	34.757	11	2.69	2.67	76.1	W.	—
March	25	16.	5	69.	36.863	16	5.71	5.95	74.2	N.W.	—
April	12	23.	15	82.	49.707	12	2.91	2.90	67.5	N.W.	7
May	1	32.	27	94.5	67.15	6	0.82	2.32	69.2	W.	5
June	3	49.	24	94.2	71.966	7	1.58	2.90	71.6	W.	8
Totals	....	332.0	....	954.7	641.377	119	41.82	....	916.0	W.	45
Means	....	29.3	....	79.5	53.448	9.9	3.48	....	78.3	W.	3.7

ions taken by Frank Osborn, Middletown, N. J., from July 1st, 1879 to July 1st, 1880, inclusive—Maximum and Minimum Temperature.

MONTH.	1879. July. Max.	Min.	August. Max.	Min.	September. Max.	Min.	October. Max.	Min.	November. Max.	Min.	December. Max.	Min.
....	86	61	85	68	87	62	79	56	54	27	42	18
....	85	59	89	69	88	63	92	61	50	27	45	21
....	87	57	92	71	85	65	81	60	54	32	60	32
....	92	69	92	72	72	67	90	54	41	22	62	38
....	93	62	84	66	84	62	81	52	47	19	73	33
....	69	56	87	68	81	59	81	55	50	18	45	36
....	73	55	88	71	78	60	71	56	55	31	58	45
....	77	56	74	69	83	65	75	57	58	32	60	40
....	82	66	81	61	79	54	76	57	59	38	62	38
....	86	66	68	53	75	51	87	63	74	58	47	36
....	89	67	77	53	75	51	75	62	76	43	60	45
....	88	67	80	60	73	55	66	59	53	43	63	36
....	77	62	84	60	75	53	75	60	78	51	50	22
....	81	61	84	61	73	51	79	49	72	49	40	24
....	87	68	85	64	72	52	78	49	65	50	46	35
....	96	69	72	64	74	49	83	58	75	50	52	25
....	96	69	74	64	73	49	89	62	66	38	38	25
....	84	59	78	66	78	50	82	61	68	38	52	18
....	78	58	69	63	76	54	81	55	48	30	44	18
....	77	58	81	62	71	52	71	39	48	32	35	28
....	76	57	81	60	72	54	67	39	36	13	36	23
....	79	60	82	60	62	56	66	45	32	13	38	15
....	91	65	89	66	59	50	67	56	39	14	40	30
....	87	67	80	62	73	49	75	40	54	24	42	30
....	78	66	75	61	75	45	53	27	52	24	45	31
....	73	65	68	60	65	42	48	27	53	23	37	8
....	73	65	66	57	68	42	59	36	56	31	33	6
....	86	70	71	55	68	48	55	37	52	32	30	9
....	83	69	78	57	72	50	69	42	61	40	45	29
....	84	69	84	59	69	54	64	45	55	23	48	35
....	79	69	85	59	....	....	54	27	....	....	57	19

MONTH.	1880. January. Max.	Min.	February. Max.	Min.	March. Max.	Min.	April. Max.	Min.	May. Max.	Min.	June. Max.	Min.
....	33	19	50	24	70	36	62	29	63	31	78	60
....	35	28	40	7	54	25	69	38	66	33	90	49
....	49	26	32	31	52	25	60	39	72	52	60	48
....	48	30	37	22	54	35	70	51	82	54	71	52
....	56	32	38	10	71	48	66	50	85	52	78	56
....	58	36	32	12	70	39	70	41	75	52	77	58
....	51	38	46	24	58	34	59	32	85	51	83	64
....	50	31	44	12	42	33	48	23	65	47	88	63
....	50	31	41	15	53	24	49	27	72	51	68	55
....	51	32	40	8	32	24	56	31	93	53	76	53
....	62	31	34	12	47	22	69	35	92	62	77	58
....	55	38	42	35	27	20	49	22	86	56	81	61
....	55	22	50	41	36	24	47	22	79	49	94	69
....	35	12	68	49	35	27	62	36	65	46	88	66
....	49	12	56	31	*	*	83	52	59	39	78	62
....	50	28	35	27	40	30	86	53	70	45	67	57
....	55	25	40	27	37	30	60	44	80	62	73	56
....	46	26	58	27	47	20	60	36	88	60	79	59
....	50	33	62	31	46	26	71	38	70	52	82	60
....	55	34	45	16	41	30	60	45	60	56	89	65
....	56	30	45	16	51	27	65	40	85	55	88	65
....	52	30	*	*	50	27	71	40	87	60	89	65
....	54	32	*	*	51	27	74	32	80	62	85	61
....	50	28	51	20	60	32	57	39	80	64	87	65
....	50	27	48	21	41	13	45	38	89	65	97	73
....	42	30	49	31	44	18	50	42	99	68	94	71
....	55	30	59	42	52	24	65	49	97	71	93	70
....	57	40	*	*	48	35	65	40	98	67	90	71
....	69	30	75	42	38	28	69	42	92	58	93	70
....	50	22	....	....	41	28	62	44	75	58	93	72
....	52	41	....	....	*	*	....	....	76	62	....	....

*No observations taken.

Maximum, Minimum and Mean Temperatures. Station, Barnegat, New Jersey.

DAY OF MONTH.	1878. July. Max.	July. Min.	August. Max.	August. Min.	September. Max.	September. Min.	October. Max.	October. Min.	November. Max.	November. Min.	December. Max.	December. Min.
1	82	61	74	64	82	73	69	56	47	37	48	36
2	82	66	85	65	84	72	75	59	56	35	57	45
3	83	67	84	67	78	70	70	59	49	38	49	37
4	88	67	82	67	74	70	71	57	50	31	53	40
5	82	66	82	69	76	66	64	53	42	28	41	29
6	77	64	79	65	73	66	64	51	56	31	43	30
7	80	66	82	65	73	66	63	46	40	34	41	27
8	81	69	86	67	68	64	66	52	43	31	38	25
9	75	64	80	68	71	66	73	59	42	29	51	37
10	73	62	81	67	73	68	67	55	53	35	55	41
11	74	64	78	68	74	68	60	55	57	35	45	33
12	70	64	77	67	76	68	58	51	62	43	40	30
13	71	64	78	65	77	67	67	47	58	37	39	27
14	75	62	76	68	73	58	68	46	46	33	42	30
15	84	63	76	70	72	56	70	57	45	30	45	33
16	72	66	80	69	69	60	72	58	53	44	34	26
17	79	65	77	70	71	55	70	62	54	50	33	22
18	94	68	83	71	80	59	70	46	54	43	37	26
19	89	68	78	69	75	63	56	44	52	43	31	21
20	79	72	79	66	82	67	62	39	49	41	32	21
21	84	72	77	65	83	69	67	43	55	40	49	23
22	79	66	72	65	70	56	64	45	54	46	47	30
23	82	63	70	65	65	56	66	56	47	38	31	19
24	78	64	73	60	74	63	61	47	56	35	29	15
25	88	66	78	65	72	63	57	43	57	43	22	13
26	78	65	72	60	77	60	61	44	54	37	31	12
27	84	65	77	59	61	49	63	54	57	37	28	20
28	77	65	75	63	60	54	58	41	57	38	31	18
29	80	63	74	63	67	54	52	38	48	35	30	13
30	72	62	78	64	68	62	63	45	48	30	35	21
31	67	62	77	64	....	....	52	40	....	....	34	19
Range	33°		27°		35°		37°		34°		45°	
Monthly Mean	71°.2		71°.1		67°.6		57°.2		43°.8		32°.9	

DAY OF MONTH.	1879. January. Max.	January. Min.	February. Max.	February. Min.	March. Max.	March. Min.	April. Max.	April. Min.	May. Max.	May. Min.	June. Max.	June. Min.
1	36	23	33	20	34	24	55	33	61	43	75	57
2	37	8	26	16	36	26	49	34	59	39	73	55
3	13	1	36	25	36	28	50	28	62	39	66	57
4	21	6	38	23	41	32	39	24	54	46	72	56
5	21	11	37	21	50	36	38	25	61	48	76	58
6	28	11	35	28	41	32	47	23	67	49	78	58
7	31	14	37	27	43	30	53	37	57	45	65	48
8	41	22	32	23	33	26	44	32	57	45	74	52
9	41	27	42	18	42	31	60	32	56	46	74	51
10	28	19	33	19	51	36	49	42	57	48	73	60
11	33	17	43	32	65	39	43	37	56	47	79	57
12	35	26	47	34	48	32	49	31	59	48	70	57
13	37	27	35	25	47	31	57	32	66	52	72	59
14	38	28	26	16	51	39	49	41	68	54	71	56
15	29	22	22	8	47	31	48	40	68	53	74	55
16	35	20	33	10	42	30	51	42	68	54	84	56
17	33	18	33	29	54	32	43	39	67	56	73	56
18	38	27	34	26	33	26	42	38	72	56	66	52
19	30	22	29	24	38	23	41	36	65	56	67	55
20	22	12	32	25	51	21	59	34	70	57	67	57
21	35	9	25	16	57	38	56	33	67	57	76	55
22	42	29	32	10	44	34	59	43	63	53	70	58
23	44	28	37	25	44	33	69	45	59	50	75	58
24	38	22	34	23	41	28	55	42	67	41	75	60
25	52	32	36	26	48	33	53	45	71	53	68	59
26	34	17	46	32	38	26	64	43	65	54	74	61
27	37	18	36	20	48	36	48	41	65	48	84	59
28	61	25	26	14	49	38	57	43	66	58	78	56
29	42	29	....	....	42	36	54	49	72	55	74	55
30	36	21	....	....	55	38	65	47	72	58	72	60
31	41	24	....	....	41	33	....	....	70	58	....	....
Range	62°		39°		44°		46°		33°		36°	
Monthly Mean	28°.2		29°.1		38°.7		44°.2		57°.6		64°.9	

METEOROLOGICAL SUMMARY FOR 1880.

Station, Bayard Avenue, Princeton, N. J. Latitude 40°.21′ *N.; Longitude,* 2° 20′ *E. Height of Barometer Cistern above Sea Level,* 225 *Feet.*

OBSERVER, PROF. C. G. ROCKWOOD, JR.

	Barometer. (Reduced to 32 degrees.) Max.	Min.	Mean.	Thermometer. Max.	Min.	Mean.	Mean Humidity.	Prevailing Wind.	Rain, (inches)*	Snow.	Days when precipitation equalled 0.01.	Cloudy days.
ry	30.424	29.307	29.940	60.5	2.5	37.71	§	N. E.	2.82	4.0	8	9
ary	30.359	28.848	29.856	67.5	8.3	35.40	69.0	N. W.	2.43	6.5	10	7
1	30.225	29.146	29.813	71.5	16.4	36.73	68.9	N. W.	5.20	9.5	16	13
	30.104	29.319	29.767	79.5	24.7	49.97	62.6	N. W.	4.12	....	11	7
	30.052	29.499	29.812	97.3	32.7	66.98	62.3	S. W.	0.62	....	4	6
	30.032	29.358	29.746	97.3	48.2	71.82	63.3	S. W.	1.41	....	8	3
	29.923	29.431	29.739	93.0	55.0	72.81	72.4	W.	11.13	....	12	7
st	30.183	29.467	29.814	89.3	50.9	70.74	77.5	S. E.	3.21	....	7	10
mber	30.116	29.436	29.802	91.0	43.9	65.27	71.6	S. W.	2.25	....	8	7
er	30.171	29.232	29.865	80.0	29.3	52.22	71.0	N.W.&S.W.	2.56	trace	10	7
mber	30.489	29.301	29.996	68.3	11.3	37.87	73.24	N. W.	2.66	3.0	8	11
nber	30.224	29.342	29.782	46.7	11.0	26.09	74.5	W.	3.57	17.75	10	11
the Year	30.489	28.848	29.829	97.3	11.0	51.97	....	....	41.98	40.7	112	98

*Including melted snow. §Hygrometer not mounted.

Summary of Weather Observations at Vineland, N. J., for 1880.

MONTHS.	TEMPERATURE.			MOISTURE.			BAROMETER.				FROST.			WINDS.							
	Max.	Min.	Mean.	Hygrom.	Rainy days.	Rain in inches.	Max.	Min.	Mean.	Range.	Any frost.	All frost.	Thunder days.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
January	61	10	41.28	71	12	2.820	30.450	29.525	30.041	.925	12	......	......	10	8	2	15	1	26	2	29
February	69	12	39.68	60	7	2.260	30.392	29.014	29.923	1.378	17	3	......	....	3	....	14	7	29	9	25
March	74	20	40.91	69	13	6.350	30.306	29.144	29.864	1.162	12	......	1	7	17	2	5	4	16	8	34
April	82	22	53.06	65	10	2.610	30.164	29.414	29.808	.750	5	......	2	1	5	1	13	9	24	2	35
May	96	34	69.20	63	5	200	30.088	29.606	29.871	.480	......	......	1	5	3	1	20	12	22	6	24
June	97	52	74.77	69	5	3.050	30.112	29.527	29.842	.585	......	......	7	12	12	....	10	7	27	13	14
July	98	56	76.45	73½	8	8.636	30.024	29.560	29.838	.464	......	......	7	9	6	....	12	3	37	1	25
August	90	50	73.03	77	8	6.635	30.230	29.592	29.909	.638	......	......	7	4	20	1	12	5	41	1	9
September	92	44	66.83	80	5	2.941	30.160	29.590	29.899	.570	......	......	......	4	11	2	12	5	29	8	19
October	92	28	63.84	74	7	1.140	30.589	29.384	29.996	1.205	6	......	......	9	16	4	5	10	24	7	18
November	67	9	38.22	63	9	4.440	30.594	29.500	30.076	1.094	21	7	......	6	10	....	13	4	22	16	19
December	50	10	26.23	56	10	7.525	30.330	29.534	29.910	.796	27	16	1	8	10	1	3	3	18	13	37
Means	....	....	55.23	......	99	50.397	....	....	29.915	....	......	......	......	....	....	....	....	....	....	....	....
Yearly range of barometer	....	....	....	......	......	....	....	....	....	1.580	......	......	......	....	....	....	....	....	....	....	....
Yearly range of temperature	....	....	....	......	......	....	106°	....	....	....	......	......	......	....	....	....	....	....	....	....	....
Total	....	....	....	......	......	....	....	....	....	....	100	26	26	75	121	14	134	70	315	83	288

GENERAL FACTS.

Under the caption "Frost," where it says "any frost," i. e. frost any part of the day, this foots up 100 frosty days for the year; while under "all frost," it means the frost was continuous through the day, and under this there were 26 days in the year.

The average number of "any frost," for 15 years, is 92 days in a year, and of "all frost," for same time, is 27 days; highest number "any frost" is 113, lowest 75, in 1878; highest "all frost," 45, in 1868; lowest "all frost," 16, in 1869 and 1870.

SNOW IN GENERAL HERE.		Any frost.	All frost.	WINDS FOR FIFTEEN YEARS.								Number of observations.
				N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	
1866	23½ inches	92	22	26	81	10	106	4	546	33	289	1,095
1867	49¾ "	91	38	25	174	31	170	15	370	36	274	1,095
1868	40 "	113	45	20	191	28	152	9	381	24	293	1,098
1869	13¼ "	101	16	3	129	23	87	10	493	28	322	1,095
1870	15 "	76	16	24	158	23	158	19	378	67	278	1,095
1871	36¾ "	78	30	14	157	14	160	22	347	85	296	1,095
1872	49½ "	113	35	21	116	16	145	22	416	125	237	1,098
1873	15½ "	92	19	16	182	39	155	26	329	120	238	1,095
1874	17 "	92	19	28	184	21	115	38	378	96	235	1,095
1875	50¼ "	101	39	29	186	19	109	27	401	76	248	1,095
1876	25¾ "	91	30	45	136	19	106	53	413	77	249	1,098
1877	36¼ "	79	18	57	178	20	86	77	343	59	275	1,095
1878	7¼ "	75	24	63	152	25	140	59	310	53	293	1,095
1879	11 "	92	21	78	101	23	93	80	369	75	276	1,095
1880	54¼ "	100	26	75	121	14	134	65	315	83	288	1,098
Total	444 9-20 "	....	....	524	2,246	325	1,916	526	5,789	1,037	4,081	16,444
Average (nearly)	30 "	92 2-5	26 8-15	35	150	22	128	35	386	69	272	....

Wind Before, During and After Rain in 1880.

Wind.		Before.		During.		After.
N.	....	5	....	0	....	5
N. E.	....	7	....	25	....	6
E.	....	1	....	6	....	0
S. E.	....	10	....	23	....	4
S.	....	9	....	15	....	6
S. W.	....	28	....	26	....	16
W.	....	0	....	2	....	8
N.W.	....	7	....	13	....	20

OUR MILK SUPPLY.

WILLIAM K. NEWTON, M. D., STATE MILK INSPECTOR.

Milk is the type of food; it is the model alimentary substance. Containing, as it does, the essential varieties of nourishment, it is sufficient for the maintenance of life, and, unaided by other foods, is able to keep the system in a healthful state. It constitutes, almost exclusively, the diet of children at that time of life, when they are the least able to withstand any interference with the purity of their food. In short, it is one of the most important articles of food that enter into daily use. It is absolutely necessary, then, that an article so universally used, and one playing so important a role in every-day life, should be easily obtained in a pure state, unadulterated, and free from the germs of disease. There is, however, no one article of food that is so frequently adulterated or sold in an impure state, as the one now under consideration.

What is to be done, then, to check this trade in impure and diseased milk? The people look to the State for stringent laws against adulteration, and to our health officers for the rigid and impartial enforcement of such laws. Our citizens are deeply interested in the subject; aside from the great loss of money entailed by the sale of watered milk, the health and lives of their children are at stake.

If we look at our vital statistics, it will be noticed that the death-rate during the first five years of life is enormous; the chances of surviving beyond the fifth year are small indeed. In infancy, when the tenure of life is the slightest, when the death-rate is the highest, and the amount of sickness the greatest, then will we find the disastrous results that follow the use of skimmed and watered milk. It is our duty to remove in every way, even

the slightest cause of ill-health or death. The lives of these children are of value to the nation.

It is estimated that a life is worth one thousand dollars to the State and every death, consequently, is so much loss; if we look at the subject in this light, leaving out of consideration the wreck and sorrow in the household, the subject is of vast importance and one demanding the most careful thought. "The child is the promise of all the hereafter. The whole future of the world is wrapped in him. Unless he fulfill this promise and grow to manhood, the family ceases, the State perishes, the human race comes to an end. The family has the intensest interest of affection in his preservation, and all the pride and power of the nation rests on his life." (*Jarvis.*)

The increase in infant mortality is largely caused by artificial feeding and the use of milk devoid of nourishment. The danger is a real one; sickness and death are caused by feeding the children on skimmed and adulterated milk. The sooner the subject is grappled with and the remedy applied the better will it be for our infant population.

Let stringent laws be passed prohibiting the sale of adulterated and impure food and let these laws be enforced. Let our health authorities be impressed with the great responsibility resting on them. Good work will be done when this nefarious traffic in impure milk is broken up and when the dealers in it—who are not inaptly called our modern Herods, the slayers of infants—are brought to justice. This branch of preventive medicine is a vital one, and demands our serious attention.

We may state, in the beginning, that this article is not an exhaustive one. It is written in the interest of public health and aims to teach the people a little about our milk supply, the adulterations used and the dangers that may arise from the use of impure or diseased milk. As far as possible technicality has been avoided, as we do not seek to teach experts; chemical processes have been omitted, as all attempts at entering into competition with special treatises on the subject would do little good. We have refrained, when we could, from burdening the text with foot-notes and references, but have added a somewhat exhaustive bibliography at the end of the paper, which may be consulted by any one wishing further information on the subject.

For convenience, we have divided the subject with various sec-

tions, and will consider it under the following headings: A, the source of our milk supply; B, adulteration; C, detection of adulteration; D, effects of impure milk on the health; E, diseased milk may cause disease in man; F, feeding influences the healthfulness of milk; G, milk as an article of contagion; H, laws bearing on our subject; I, the inspection of milk; J, bibliography.

A.—THE SOURCE OF OUR MILK SUPPLY.

One who has not investigated the subject will be astonished at the immense amount of capital invested in the dairy interest in our State. There are in New Jersey about one hundred and sixty thousand milch cows, representing, in value, five million six hundred and eighty thousand dollars; if to this is added the capital invested in the milk business in its various branches, not far from seven million dollars will be found to be locked up in the different branches of the trade. The daily production of milk is about two hundred and forty thousand gallons; a large quantity of this is shipped to New York City; the Midland Railroad carries, on the average, four hundred and twenty cans a day to New York; the Central Railroad, three hundred and twenty-five cans; the Delaware, Lackawanna and Western Railroad, three hundred and eighty cans. By far the largest amount produced is used in our own State, in the butter and cheese factories and as food.

New Jersey contains but few large cities; there are but seven cities with a population greater than twenty-five thousand. Small towns preponderate. Hence the greater quantity of milk used as food is obtained in the towns in which it is used, very little being transported from the source to the place where it is consumed. Newark, Jersey City and Hoboken are the only large towns that receive much milk by the railroads. Inspection, then, is not easy, and the supply being in the hands of many small dealers is not well under control. The greatest source of impure milk is that produced by cows shut up in the stables in the cities; these animals are poorly housed and fed, and milk thus made cannot be of good quality; this last remark is peculiarly applicable to the cities of Newark, Jersey City, Hoboken and Paterson. Our farmers are, as a rule, honest, and endeavor to supply a pure article; the greatest trouble is with the dealers

in the towns and cities, who are not themselves dairymen, but who buy from producers, and who adulterate to a greater or less degree. Only local inspection can reach them. Many of the cheese factories send skimmed milk to our towns and cities, and the use of this article cannot but be followed by a long train of disease among the children.

B.—ADULTERATION.

The list of substances said to be used for the purpose of adulterating milk, is a long one. Every authority writing on the subject of milk adulteration has, in preparing the work, copied from various books the names of materials at any time used, hence they make now a formidable catalogue. Practically speaking, adulteration, in this country, is limited to the use of water, sodium carbonate or bicarbonate, potassium nitrate, turmeric, annatto, caramel, salt, borax, and possibly magnesium carbonate and glycerine. Fortunately, the adulteration practiced is limited and the substances used are easy of detection.

The substance must needs be such that its introduction into the milk will not be detected by the naked eye, and must neither be precipitate nor float on the surface. At the same time the material added must not coagulate on boiling, nor give taste, odor or color to the milk by which its presence may be easily discerned.

We have, notwithstanding the fact that many of these materials are never or but seldom used in this country, thought it best to mention the substances said to be used, in order to make the subject more complete. The substances thus said to be used in the adulteration of milk are:

Water,	Starch,
Sodium carbonate and	Arrowroot,
Bicarbonate,	Gum Arabic,
Borax,	Dextrine,
Magnesium carbonate,	Gum Tragacanth,
Potassium carbonate,	Chalk,
Sugar,	Gelatin,
Caramel,	Glycerine,
Potassium nitrate,	Emulsion of almonds and
Turmeric,	Hempseed,
Annatto,	Brains,
Flour,	Hempseed.

We will now take each in turn, and state for what purpose it is added.

Water is by far the most common adulterant. It was estimated by Professor C. F. Chandler, that "the average milk sold in New York City, consisted of three-fourths milk, and one-fourth added water. The 120,000,000 quarts of milk sent annually to New York receive an addition of 40,000,000 quarts of water, which sold at ten cents per quart, brings four million dollars per annum, or twelve thousand dollars per day. This fraud, besides being expensive, exerts a most unfavorable influence on the health of young children especially." It is difficult to trace the adulteration with water to its source; milk passes through so many hands before reaching the consumer, that it may have received two or three dilutions before being served on his table. In our tours of inspection in various parts of the State, we found that the farmers, as a rule, were honest in their endeavors to send pure milk to market, but there are many dishonest men among that class. A farmer, for instance, may have a contract to supply a dealer with five cans of milk daily; from some cause the supply falls short ten quarts, and if the producer be dishonest, the deficiency is made up with water. Now the ten quarts in five cans may appear to be a small quantity, and will be difficult of detection; but when this milk reaches the middle-man, and his supply is not sufficient to meet the demand, he dilutes it to bring it up to his quantity, and by the time the consumer gets it, three or four dilutions may have been practiced. The most adulterating is not done by the farmer; the exaggerated examples are to be found in our cities, among the smaller dealers. It is to be hoped that if adulteration is done with water, that it is free from the germs of disease.

Sodium, carbonate and bicarbonate. These substances are added to disguise an excess of acidity, and in some cases, to increase the specific gravity.

Borax is added for the same purpose, and also to retard the separation of cream, and to preserve the milk.

Magnesium and potassium carbonates are added to correct acidity and to cover a blue tinge.

Sugar and caramel are used to give color and to develope the flavor of impoverished milk.

Salt is used as a flavoring agent and to increase the specific gravity of skimmed and watered milk.

Potassium nitrate has been discovered in milk from Orange County, N. Y. It is added to increase the specific gravity and to act as a preservative.

Turmeric and annatto are used to cover a blue color.

Flour, starch, arrowroot, gum-arabic, gum-tragacanth, dextrine, emulsion of almonds and hempseed are said to be added to increase the consistency of milk, but the fraud is so transparent that it is hardly probable that any of these substances can be added successfully.

Chalk. This substance is popularly supposed to be a favorite adulterant. It is hardly probable that it is used; the certainty of its detection is against its use. It is asserted that chalk is used to make milk that has been watered white and to correct acidity.

Gelatine has been added to give consistency.

Glycerine is used to increase specific gravity, to give consistency and taste.

Brains. Every book on food-adulteration mentions the fact that calf-brains have been used to thicken milk. This may have been done at some time, but it is difficult to trace this statement to the originator, and it is hardly probable that any person, however depraved, would use this substance as an adulterant.

C.—DETECTION OF ADULTERATION.

Having mentioned the various adulterants and the purposes for which they are used, we will now consider the methods employed for their detection.

Water. There are three methods for determining the amount of water added to milk: 1, by determining the specific gravity, 2, by chemical analysis, 3, by estimating the percentage of cream. Unless a standard of purity is fixed on beforehand it will be impossible to estimate the quantity of added water. Whether a chemical analysis is made or a hydrometer used it does not alter the case; a standard must be agreed on.

In New York City, the hydrometer is used as an instrument for determining the amount of dilution with water. In Massachusetts, Rhode Island and Maine a chemical examination is required by law when suit is brought against an offender.

1. Specific Gravity Method.—For determining the specific gravity, a hydrometer is ordinarily used, but in cases requiring great accuracy the gravity is arrived at by weighing a known quantity of the milk. The latter plan being employed by chemists. The hydrometer used in testing milk, is called, in this country, a *lactometer*. All tests are made at 60° Fahrenheit.

Much has been written, within the past few years, for and against this instrument; but had the instrument and its use been clearly and honestly defined, there had been no necessity for any discussion. The lactometer is nothing but a hydrometer, and it can do no more than register the specific gravity of milk. It can, within certain bounds, tell the amount of water added, and can, with a certain degree of accuracy, detect skimmed milk.

If we take pure milk, and allow the lactometer to float in it, the instrument will sink to a certain mark in the stem. If we now add water to the milk, the specific gravity is lowered, and consequently, the lactometer will sink lower in the fluid. If we skim the milk, the instrument will float higher in consequence of the increased specific gravity. The lactometer favors the milkman rather than the consumer; the only error it can make would be in a case where the milk had been *adulterated* with cream; then the specific gravity would be lowered and the instrument would register a point equal to watered milk. It is well to bear in mind that the lactometer, to be of any service, must be used by a person who is a competent judge of milk and is thoroughly acquainted with the pure article; such a person would easily distinguish between watered milk and milk rich in cream. A person conversant with milk can tell, with any instrument, whether a milk is rich or poor, and a man is not competent to act as inspector who cannot make these distinctions.

Now, if we use the lactometer as the instrument for the detection of added water, what specific gravity shall be taken as that of pure milk? The New York Board of Health has taken the lowest average for pure milk, and fixed the standard at the specific gravity of 1.029 at 60° F. We do not propose to lengthen this article unnecessarily by quoting authorities to prove the accuracy of this standard. Suffice it to say, that hundreds of samples of milk, known to be pure, have been examined by the New York authorities, and in no case, where the milk

was from a healthy cow, did the specific gravity fall below that figure. And, in this State, in our capacity of State Milk Inspector, we have inspected hundreds of samples of milk, known to be absolutely pure, and in no instance did we find a single sample to have a specific gravity as low as 1.029. We can state, then, that the New York standard is many degrees too low, and admits of watering from five to ten per cent. If any one wishes to consult authorities, the list of authors appended to this article may be used.

In lawsuits, in New York City, the lactometer has many times been criticised, but as a rule, it has come off victorious as a compent instrument with which to take the specific gravity of milk. Prof. C. F. Chandler, President of the New York Board of Health, has testified in these cases, that the instrument is able to register the specific gravity of milk. Prof. Morton, of Stevens' Institute, said that 1.029 was a correct standard, and that a lactometer of that standard would give the specific gravity. Prof. Barker, of the University of Pennsylvania, testified that the lactometer was a good test for the specific gravity of milk; chemical analysis was the best way to test the *purity of milk*. The evidence all tends to prove the statement, that the lactometer will give correctly the specific gravity of milk; more than this it will not do.

As the lactometer of the New York Board of Health is used extensively in this State, it will be well to describe its construction. The scale of a hydrometer long enough to use in testing milk would be inconveniently long and the figures confusing. To obviate this, Dr. Chandler has made a scale for his instrument which is easy to read, and which gives an idea of the percentage of adulteration with water. A hydrometer stem is taken, and at a point equal to the specific gravity 1.029—which is the standard for pure milk—is marked 100, at the top of the stem, at a point equal to 1.000 (or pure water) the lactometer is marked 0, the intervening space being divided into 100 divisions; below one hundred, 30 degrees are marked off equidistant apart. "The point to which the lactometer sinks in the milk under examination, indicates the percentage of milk in 100 parts. Thus, if the instrument sinks to 80, the milk is 80 per cent. pure, and contains 20 per cent. added water." But this

assumes the original milk to have a specific gravity of only 1.029, which is lower than good milk.

The lactometer errs, therefore, in not showing the dilution of good milk down to our low standard, and consequently in reporting on a portion of dilution. If the lactometer is used in this State to detect adulteration and watering, the standard of purity should be fixed at a higher point than 1.029, or 100 of the New York instrument; for as previously stated the figure allows too wide a margin for watering. We hold to the opinion that in cases of suit, a chemical analysis should supplement the use of the lactometer; for if the specific gravity be raised by the addition of any substance like salt, caramel, etc., that instrument will not detect it. For rapid inspection the lactometer is of great service, and in a short time the inspector can examine many cans, easily selecting the pure from the impure, and in case of suspected adulteration a chemical analysis may follow.

2. *Chemical analysis.* As in the case of estimating the degree of watering by the lactometer, an arbitrary standard of purity must be fixed on before any conclusion can be arrived at by a chemical analysis.

The law of Massachusetts fixes a chemical standard of purity. It reads: "In all cases of prosecution, if the milk shall be shown upon analysis to contain more than 87 per cent. of watery fluids, or to contain less than 13 per cent. of milk solids, it shall be deemed, for the purpose of this act, to be adulterated." Massachusetts, then, has fixed a standard of purity. There is no question to be debated in case of suit as to the inspector being an expert, for he turns the sample over to the State analysist and the latter decides on the character of the milk. This method makes the question an easy one to decide in case of suit, and the discussion as to the accuracy of the lactometer, or any other instrument is avoided. This abitrary standard has been determined on from analysis made by Sharples, Babcock and other chemists. There is here, however, a wide margin allowed for milk of a poor character, and this margin is in favor of the milkman. We give the result of an analysis of pure milk from ordinary cows for the purpose of showing that 13 per cent. of total solids is a fair standard by which to judge the milkman:

Analyst.	Number of Cows.	Total solids.
Sharpless	22	14.49.
Babcock,	8	14.55.
Vaughn,	58	14.08.
Newton,	24	14.26.

If the State of New Jersey demands that a chemical examination be made to determine the degree of adulteration, a course which we favor, it would be well to adopt the standard of Massachusetts; this will allow dairymen to sell milk that will represent a fair degree of purity, and, at the same time, be equitable for both sides.

We do not wish to take the space requisite to discuss, at length, the various chemical manipulations used in milk analysis. The special works on the subject must be consulted. We will describe, however, the method we employ to determine the amount of water and milk solids: The sample to be analyzed is thoroughly mixed; 5 *Grams* of the milk are accurately weighed out in a tarred platinum dish, this is placed on the water bath and allowed to evaporate for three hours; the dish is carefully dried and weighed; the loss in weight will equal the amount of water, and the weight is that of the total solids. This method is more accurate than where the milk is measured with a pipette.

3. *By estimating the per cent. of cream.* This method is very inaccurate; the separation of cream is influenced by the temperature and various other factors. The cream glass used is a graduated tube, the graduators being from 0 to 20, as a rule; the milk is placed on the glass and allowed to stand at a temperature of 55° F., or 60° F., for twenty-four hours, when the per cent. is read off.

A very rapid and easy method—at the same time accurate—for getting at the amount of fat, and hence the degree of dilution with water, is the lactobutyrometric process. The process is much used by Prof. G. C. Caldwell, and is described by him in the "First Annual Report of the Cornell University Experiment Station."

We have employed the method by using a burette instead of the ordinary apparatus, and have found the process accurate and very satisfactory. The results correspond very closely with those obtained by chemical analysis. We insert a description of the instrument, and the process by Prof. Caldwell, as it is of

great intent to dairymen, not to mention chemists. The process is peculiarly useful in butter and cheese factories.

"A simple, and at least tolerably accurate method of testing milk, which shall not only give some idea of its quality, but shall also detect adulteration or skimming without fail, is acknowledged by all to be one of the great desiderata, especially in butter and cheese factories. * * * * A method of examination of milk, by which such information may be gained, that requires no expensive apparatus, and is easy and quick in execution, is found in Marchand's lactobutyrometrical process, as more recently modified by two German chemists, Schmidt and Tollens; in their hands, its indications came nearly always within 0.2 per cent. of the truth, and usually much nearer than that. In the case of thirty-nine determinations of fat in milk of all degrees of richness, made by the chemists just named, in no instance was the difference between the result obtained by this method, and by the most accurate chemical method, greater than 0.2 per cent., and in all but fourteen tests it did not exceed 0.1 per cent.

In twelve cases the two methods of analysis gave almost the same results.

DIRECTIONS FOR THE USE OF THE INSTRUMENT.

"Into the lactobutyrometer, a glass tube closed at one end and provided with a graduated scale near the open end, put, first, exactly ten cubic centimeters of the milk; this is done by filling the pipette marked *milk* with the milk to be examined, up to a short distance above the mark on its neck, by suction at the upper end while the point is dipped in the milk, then removing the pipette from the mouth and quickly closing the open end with the ball of the fore finger before enough milk runs out to bring the level below the mark; then remove the point of the pipette from the milk, wipe it off, and holding the instrument with the other hand so that the mark on its neck is on the same level with the eye, slowly and slightly raise one side of the finger closing the opening till the liquid begins to drop out at the lower end; when the level of the liquid just reaches the mark, close the opening again, hold the point of the pipette in the mouth of the lactobutyrometer and remove the finger from the upper opening; when all the milk has run out, allow about a

minute for the pipette to drain while held in the same vertical position, and finally blow out the last drop that remains adhering to the narrow opening below; during this operation it is best that the lactobutyrometer should be supported in an upright position so that it will not be necessary to hold it, and both hands will be free to manage the pipette; and care should be taken not to touch the sides of the tube with the point of the pipette, lest some of the milk which should go into the tube may remain adhering to its mouth.

Ten cubic centimeters of milk being thus transferred to the tube, next put into it exactly ten cubic centimeters of ether, with the aid of the pipette marked *ether*, then close the mouth of the tube with the cork that accompanies it, and, grasping the lower end of the tube in one hand and the upper end in the other with a finger over the cork to keep it in place, give the contents of the tube a vigorous shaking, carefully lifting the cork two or three times to allow vent for the ether vapor that accumulates in the tube. When the liquid presents the appearance of a uniform creamy consistency, without any visible clots, remove the cork and add, by means of the pipette marked *alcohol*, exactly ten cubic centimeters of this liquid, close the tube again and, at the same time, pour some of the alcohol, to the depth of about half an inch, into the saucer at the base of the brass cylinder, which also accompanies the apparatus, and which has previously been three-fourths filled with water, and set fire to this alcohol; while the water is thus being heated, give the contents of the tube another vigorous shaking in the same manner as before, with the same precaution in regard to opening the tube two or three times, till all the coarse clots formed when the alcohol was added are broken up, and the contents of the tube present a uniformly fine granular appearance. When the temperature of the water in the brass cylinder reaches 40 to 42 degrees Centigrade (104 to 108 degrees Fahrenheit,) blow out the flame of the burning alcohol, and put the lactobutyrometer in this warm water. The solution of fat immediately begins to collect at the top of the liquid; when, after five or, at most, ten minutes, no more fat globules appear to rise, and the layer of the solution does not increase in thickness, the lactobutyrometer is put in the glass cylinder which has already been nearly filled with water at a temperature of 20 degrees Centigrade, or 68 degrees Fahrenheit;

the fatty layer will become turbid and generally increase slightly in thickness, and finally, in a few minutes, it becomes clear and is then ready for measurement.

The number of the degrees is then read off on the scale on the tube, at which the lowest part of the meniscus or hollowed surface of the liquid stands, and also the degree at which the lower level of the fatty solution stands, where it meets the liquid below it, and from which it is distinguished by a sharply marked line; substract the second number from the first; search for the number expressing this remainder in the column headed *ether fat solution* in the following table, and against that figure in the column headed *per cent. of fat* the corresponding per cent. of fat in the milk will be found."

(The table will be found in the report referred to.) A full description of the process may be found in the report.*

We now pass on to the consideration of other adulterants.

2. *Sodium carbonate and bicarbonate.* An excess of alkalinity would lead us to suspect the addition of these substances. Evaporate the milk to dryness, incinerate the contents of the dish and to the ash add an acid. If carbonates be present effervescence, due to the liberation of carbonic acid gas, will ensue.

3. *Borax.* Evaporate to dryness, incinerate and test for boracic acid in the ash.

4. *Magnesium and potassium carbonates.* Test for carbonates in the ash.

5. *Sugar, caramel.* As the process for determining these substances is somewhat lengthy we refer to special treatises on analysis. (See the *Analyist,* March, 1880, p. 37.)

6.—*Salt.* Evaporate the milk to dryness, incinerate the contents of the dish. Taste the ash, an excess of sodium chloride is easily discovered. Test for excess of chloride with a standard solution of nitrate of silver.

7.—*Potassium nitrate.* Test for nitrates in the ash.

8.—*Turmeric and annatto.* Coagulate the casein with alcohol or an acid, filter and add caustic potassa to the whey. If turmeric is present the yellow color becomes brownish. If annatto be present a red color is given.

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*The instrument is made by Childs & Jones, Utica, New York.

9.—*Flour, etc.* Flour, starch and arrowroot give the characteristic blue color when tincture of iodine is added to the milk after boiling. The microscope will detect the starch granules if the milk has not been boiled.

10.—*Gum-tragacanth, gum-arabic and dextrine* are detected by alcohol which, when added to the whey, causes a precipitate of flakes to fall.

11.—*Chalk.* Let the milk stand in test-tube. If any considerable quantity of chalk is present it will precipitate. A drop of acid added to the precipitate will cause effervescence.

12.—*Gelatine.* This will coagulate on boiling and settle to the bottom of the test-tube.

13.—*Glycerine.* (see Blyth, p. 49).

14.—*Brains.* Detected by the microscope.

D.—EFFECTS OF IMPURE MILK ON THE HEALTH.

It is our purpose in this section to consider the effects resulting from the use of skimmed and adulterated milk. Milk from diseased cows as a cause of disease in man will be dwelt on in another section.

Skimmed milk is milk deprived of its most nutritious ingredient—the fat. Hence, to expect such an article of food to be as nourishing as rich milk, would be folly ; nor would one hope to have a child thrive on milk that had been diluted with water, or otherwise adulterated. We have seen that skimming and watering are almost the sole methods of tampering with milk, and that other forms of sophistication are rarely met with in this country. If we leave diseased milk out of consideration, for the present, we will have to look to impure milk, as above described, as the great factor of mal-nutrition. Feeding a child on milk bereft of its most nourishing ingredient will result in starvation.

In order to have an infant thrive well on cow's milk, the composition must be as nearly like human milk as possible, and any disturbance of the normal relations of the various ingredients must be avoided, or derangement of the child's health will almost certainly follow. The fat, the casein, the sugar and the salts, must be given in natural proportions, or harm will result. Skimmed milk is deficient in fat while it contains an excess of casein. A diminution in the quantity of cream will be followed

by wasting; an excess of casein will cause gastric and other troubles; while too little of the salts may cause serious changes in the bony framework. Cream is the most digestible form of fat. "It will often be found in practice, that the addition of a little more cream to the baby's food will correct any mild indigestion, due to an excess of casein." (*Wiggin.*)

The principal and most fatal diseases of infancy are those characterized by wasting, that is the system loses its fat. Adipose tissue will not accumulate in the system if health is impaired, or if fat is not supplied from without, in the food. Wasting is a sign of defective nutrition. Now, if we try to nourish a child on skimmed or watered milk, fat in insufficient quantities is supplied, wasting results, death may follow; or, in other words, the child is starved.

"Of all the deaths that occur in the great cities of North America, from a quarter to a third take place under one year of age, and from two-fifths to one-half under five; out of one hundred live-born children, about twenty-five die before the end of the first year of life, and from forty to fifty before reaching the close of the fifth year." (*Curtis & Jarvis.*)

Milk being the principal article of diet in infancy, we naturally turn to that period of life to find the effects of impure milk; and it is just at that period of life that we note the highest mortality. Thousands of children perish annually from starvation, due to feeding on skimmed and watered milk. "The skimming and watering of milk—the darkest feature of which is the increase in the rate of infant mortality thereby caused—should be stigmatized as a grave crime; and the offender, when brought to light, should be subjected to some severer penalty than a paltry fine. Once let it be understood that the perpetrator shall be subjected to some ignominious punishment, proportionate to the offence, and, what is now considered as a trivial misdemeanor, will henceforth take rank among the impermissible as well as forbidden offences." (*Nichols.*)

That infant *morbility* and mortality are increased and caused by the use of impure milk, is no idle fancy; that poor milk is a factor, is proved almost daily in the practice of physicians having much to do with children's diseases. Where is the physician who has not seen cases of slow starvation of infants, resulting from the use of this inferior milk? The merest tyro in medicine accepts these facts as proved beyond doubt.

It is not long ago that three children died of starvation in the practice of Dr. Da Costa, of Philadelphia. The cause of death was found in the milk which analysis proved to be skimmed and then watered one and one-half times*.

Authorities and instances might be cited at great length to prove the truth of these statements, but our space will admit only of the bare mention of facts as given.

Is it not time, then, that the sale of this impure food was stopped? The sale will go on, despite legislative enactments, till checked by energetic health officers in our towns and cities, and to them the public look for relief.

E. MILK FROM DISEASED COWS MAY CAUSE DISEASE IN MAN.

It is conclusively settled that many of the diseases of cattle are transmissible through the milk, and it is indeed fortunate that this secretion diminishes or disappears in many of the diseases of animals; notably anthrax.

Tuberculosis, without doubt, may be carried into the human, system, by the milk from cows sick with that disease. In a cow which was sold to be killed, Pench recognized the existence of phthisis. Milk from this cow was fed to pigs and rabbits. These animals thus fed, when killed showed tuberculous lesions in the lungs, intestines and elsewhere. The experiments made were quite conclusive and proved, without doubt, that tuberculosis is transmissible from the cow to other animals by means of the milk.

Experiments similar to these, made in Germany, and by Burdon, Sanderson and Wilson Fox in England, also prove that tuberculosis can be carried and will produce disease in healthy animals when the milk or flesh of these animals is used as food. Tuberculosis is a very common disease in cows, especially when they are improperly housed or fed. The stables in our cities should be closely watched, as the danger of transmission is a real one, and proper precautions should be taken to check the sale of milk from cows sick with phthisis.†

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* Amer. Journ. Med. Sci. July, 1880. p 271,

† Vide *Med News and Abstract*, Sep. 1880, p. 533; *Br. Med. Journ.*, July 31, 1880; *N. Y. Med. Journ.*, Vol. III, pp. 241 and 321. "Tuberculosis of milch cows and the contagiousness of Tuberculosis, etc.," A. N. Bell, Am. Med. Ass'n, 1877; Forc., p. 484; Blyth. p. 54 *et seq.*

Milk from cows affected with the foot and mouth disease (Aphtha Epizootica) when taken into the system, is the cause of serious ill health. The disease is an exceedingly contagious one prevailing among cattle and other animals. The following train of symptoms follows the ingestion of milk from these animals; loss of appetite, nausea, accelerated pulse, swelling of tonsils and submaxillary glands, an outbreak of vesicles upon the lips and tongue. The lower extremities are covered with a peculiar cutaneous eruption.*

The results of analysis and microscopic examination of milk, from cows affected with this disease, are given in *The Analyst*, May, 1878, in an article entitled "Diseased Milk," by C. Heisch, F. C. S.

Pleuro-pneumonia is a very common disease among cattle, but the secretion of milk is, as a rule, checked in the early stages. Hence there is little possibility of it being used as a food.

The subject of transmission of diseases from animals by means of the milk is as yet in its infancy, the literature being small. But investigations are being made in Europe and in this country, and all published statements prove that it is extremely dangerous, to human life and health, to use the milk from diseased cows as food.

A source of sickness not mentioned above is found in the milk from cows secreted just after calving, and called colostrum. This produces diarrhœa in children. The microscope will detect colostrum corpuscles in such milk.

Milk contaminated with pus from an inflamed udder, or an abscess of the udder, will cause stomatitis and diarrhœa in infants.

It is hardly necessary to extend this section beyond these few hints; sufficient has been said to warn persons against the use of milk from cows not in perfect health.

F.—FEEDING INFLUENCES THE HEALTHFULNESS OF MILK.

That a healthy cow allowed to feed on rich meadow grass, and in the evening carefully housed, cared for and given a diet of meal and hay, will yield a rich, creamy milk, is evident; and that a child fed on this milk will keep in good health, grow fat

*Blyth, p. 56, *et seq.*; 2nd annual report of Mass. State Board of Health.

and prosper, is equally plain. On the other hand, we know that a sickly cow, fed on distillery swill, improperly housed and cared for, will yield a thin, watery milk; and that a child fed on such milk will lose health, have diarrhœa and waste away. These facts are almost self-evident; so patent are they that it seems hardly necessary to mention them. Yet, they are ignored daily, and people wonder at the mortality among infants in our cities. Let us examine the subject a little more minutely.

The influence of different kinds of food on the yield and quality of milk is an interesting question to the dairymen, from a business point of view. But, to us, as physicians and sanitarians, it is of vast importance as affecting public health. The consideration of the subject, in its commercial aspects, is foreign to the purposes of this paper; readers desiring information on this branch of the topic are referred to the admirable works of Flint and Thomson; to the reports of the agricultural boards of the various States, and especially to the reports of the Secretary of the Massachusetts Board of Agriculture.

It is our intention to look at the subject as a sanitarian, and see what foods do render the milk unhealthful. Great service would be done the State, if the subject was thoroughly investigated, for the attention it deserves has not been given to it. Many of the diseases of infancy are undoubtedly caused or aggravated by milk from cows fed on poor or unwholesome food. The length of this paper would be unnecessarily increased, if we were to devote the space to the subject that it deserves; we must content ourselves, then, by giving a few hints, with the hope that better and more thorough work will be done by another. We have selected for consideration points not touched on in books and not generally known to the public.

Brewers' grains. So much has been said in the public papers about this that it deserves our attention. Not much information can be obtained from books, as to the effect of milk from cows fed on brewers' grain, on the health of children, but little has been written on the subject. There is, however, a strong popular impression that the milk thus produced is unhealthful, and that health of infants is compromised or endangered by its use.

During the past spring and summer, we have taken pains to consult with farmers in all parts of the State, as to the effect on the health of cows by using this substance, and have accumu-

lated evidence from about seventy sources. The facts thus adduced will be noted further on.

This substance is obtained from breweries. After the barley is "malted," the malt is crushed, placed in a tub with hot water, and an infusion made. During these processes much of the starch in the barley is converted, by the action of diastase, into sugar and dextrine, and these substances go into solution. This infusion of the soluble parts of the malt is strained off, and the insoluble portions are sold under the name of brewers' grains, or beer grains. Beer grains, when dried, contain about ten per cent. of water, fourteen per cent. of albuminoid, twenty-one per cent. of sugar, thirty-two per cent. of starch, and six per cent. of fats.

Dr. Voelcker, of the Royal Agricultural Society, says: "Brewers' grains are much more nutritious than their appearance seems to warrant. Even in the wet condition in which they are obtained from breweries, they contain a fair proportion of ready-made and flesh-forming matters. Dried brewers' grains make good milk, and are fully as valuable, as a food for cows, as barley meal. It is the custom among our farmers, on account of cheapness, to feed this substance to cows, either alone or mixed with meal, hay, or other fodder. In some parts of the State, large quantities are purchased at one time, and stored on the farm, in pits and barn-cellars. The grains are generally wet, and if not used immediately, or if improperly cared for, they ferment, become sour, and in a short time, rot. When given to cows in a sour or rotten state, they cannot but be injurious, and produce poor milk. The evidence given by farmers proves that fresh beer grains, given in small quantities, mixed with other food, are not unhealthful, and that the milk produced is of good quality. When used to the exclusion of other food, or in a fermented state, the milk produced is thin and watery, with a small per cent. of cream; but the quantity is increased. The grains seem to act as a stimulant to the mammary glands, exciting the secretion of milk. As a rule, it increases the quantity, but impairs the quality. The opinion among the better class of farmers is, that the milking life of the cow is shortened by the use of this food, and that its use should be discountenanced.

As to the effect of milk thus produced on the health of

infants, there is great uncertainty of opinion among physicians, and it is believed that the use of this milk is followed by diarrhœa and wasting. One physician of note asserts that it is a fruitful cause of eczema in children, but as this disease is very common in childhood, even when the infant is fed on breast milk exclusively, this statement cannot be accepted as positive.

Distillery swill. Swill milk is rarely heard of now, but not many years ago it was a fruitful cause of disease and death in children. Fearing that the lessons of the past may be forgotten we are constrained to mention it as a possible cause of disease. Distillery swill "if properly fed in limited quantities, in combination with other and more bulky food, may be a valuable article for the dairyman, but if given, as it too often is, without the addition of other kinds of food, it soon affects the health and constitution of the animals fed on it. Where this forms the principle food of milch cows, the milk is of a poor quality; it contains, often, less than one per cent. of butter, and seldom over one and three-tenths or one and one-half per cent. Its effect on the system of young children is, therefore, very destructive, causing diseases of various kinds, and, if long continued, certain death." The adulteration of pure milk from the healthy cow by water, though dishonest and objectionable in the highest degree, is far less iniquitous in its consequences, than the nefarious traffic in "swill milk," or milk produced from cows fed entirely on "still slops," from which they so become diseased, after which the milk contains a subtle poison, which is as difficult of detection, by any known process of chemistry, as the miasma of an atmosphere tainted with yellow fever or cholera. The fact is sufficiently palpable, that no pure and healthy milk can be produced by an unhealthy and diseased animal, and that no animal can long remain healthy that is fed on an unnatural food, and treated in the manner too common around the distilleries of many large cities." (*C. L. Flint, pp.* 144, 208, 216.)

Where swill-milk was sold in New York, a few years ago, "it was found different in alimentary character from that produced by cows that were fed on grass, hay or grain. It was not so well digested in the stomach, nor had it the nutritive power to create flesh and sustain strength. The children lost flesh and failed to gain it. Their skins were pallid, sometimes discolored and corrugated. Their countenances had the appearance of old

age, rather than the bright and lively bloom of childhood. They suffered from diarrhœa and dysentery and great debility, and many died." (*Jarvis.*)

Fortunately, no "swill-milk" is sold in this State at the present time, but it is well for health officers to be on the lookout for it. The sale of it is, in this State, considered a misdemeanor, punishable by a fine of fifty dollars and imprisonment for thirty days. The laws of Massachusetts, New York, Michigan and other States also forbid its sale.

Various plants, when eaten by cows, affect the taste and color of milk. It is well known that turnips and wild carrots impart a very unpleasant taste and odor. The poison oak, (*Rhus Toxicodendron*) when eaten by cows, so affects the milk that it is almost a poison to children. When a child takes this milk, there is extreme weakness, vomiting, a fall of temperature, the tongue is swollen and dry. *Parkes.*

The taste of milk is altered by cows feeding on the following plants: wild turnip, charlock, rape, wormwood, ramsons, cypress spurge, hedge hysop, black hellebore, German chamomile, maize. Color is imparted to milk by the following: Yellow bedshaw, madder and species of carex, scirpus, equisetime, ranunculus. Euphorbia gives a reddish color, and the milk is made blue by alkanet, water violet, purple cow wheat, perennial mercury, common knot grass, buckwheat, yellow rattle. (*Calder.*)

G.—MILK AS A VEHICLE OF CONTAGION.

That milk will act a carrier of the germs of contagious diseases is proved beyond doubt. Epidemics of typhoid fever and scarlet fever, occurring in England, have had their origin in contaminated milk.

An epidemic of typhoid in the town of Eagley, England, was investigated by the medical inspector of the Local Government Board. It was found that a small brook had been used by the mill operatives so that large quantities of fecal matter were daily emptied into the stream. It was also found that one of the workmen was ill with a disease supposed to be typhoid fever. The water from this brook was used at a dairy and was the only supply in use. There was no positive evidence that the milk was diluted with this water, but it was acknowledged that the milk cans were washed with it. Of fifty-seven families supplied

with milk from this dairy, fifty-five were attacked with typhoid fever. About one hundred and forty-six persons were sick with the disease. The inspector says: "Not one household, to which the milk was traced, did I find free from the disease."

An epidemic in Islington, England, was also traced to milk diluted with contaminated water, as the cause.*

Scarlatina. In an epidemic of scarlet fever in South Kensington, England, it was observed "that one of the first severe cases which initiated an epidemic, occurred in the house of a milkman whose wife milked the cows, the milk being supplied to about twelve families in the city. In six of these, cases of scarlatina occurred in rapid succession, at a time when the disease was not epidemic, and without any communication having taken place between those that became affected and the persons who brought the milk. It is very probable that, in this instance, the milk was the carrier of the contagion, as, previous to the distribution to the several consumers, it had stood in a kitchen which before had been used as a hospital for a scarlatina patient."†

English public health reports and medical journals contain many instances like the above. The danger, then, is a real one and the public should be warned in time to avert any such epidemics in this country.

H.—LAWS BEARING ON THE SUBJECT OF OUR MILK SUPPLY.

The dangers to public health arising from the use of adulterated, skimmed and diseased milk having been pointed out, it will be well for us, now, to review briefly the character of the various State laws having for their object the regulation of the trade in this article. We can then the more readily point out the imperfect or inefficient parts of these laws.

The first act on our statute books is that of April 7th, 1875, which reads:—"The sale or keeping of adulterated milk is a misdemeanor, punishable by a fine of $50, and imprisonment for 30 days. To adulterate milk, or to keep cows for the production of marketable milk in an unhealthy condition, or to sell milk as pure milk from which the cream has been taken are also

*For full accounts of these epidemics, see 8th Annual Report, Mass. State Board of Health; *Practitioner*, Vol. XVII, p. 225; Vol. XI, p. 234; *Med. Times and Gaz.*, Nov., 1870.

†*Practitioner*, Aug., 1876, p. 155; Oct., 1877, p. 307. 9th Annual Report, Mass. State Board of Health.

punishable as above. The addition of *water or any substance* is defined as an adulteration. Milk from cows fed on distillery waste (commonly called "swill") is declared impure and contrary to this act."

This law is a public health measure and aims to secure for the people a supply of pure, healthful milk. If the mere enacting of a law could do good, this act would be all that was necessary. But it has remained on our statute books for more than five years, inoperative and is practically a dead-letter. We doubt if a suit or conviction has been had under it. Many reasons may be found for this law not being enforced.

It fails to reach the great mass of petty offenders in our larger cities. Citizens will not take the time necessary to follow up a suit, nor will they, if fraud is really detected, act as complainants. The fines are too low, if we consider the enormity of the crime, which is looked on only as a misdemeanor. Besides all this, no standard of purity is fixed by law, on which to base degrees of sophistication.

If we were allowed to modify this act so as to make it practical we would suggest the following alterations:—The burden of its enforcement should be placed where it belongs, on the public health officers in the towns and cities, and they should be held responsible for carrying out the requirements of the act. The fines and imprisonment should be made proportionate with the crime committed; we think the public is endangered by the sale of impure milk, and the crime should be punished by a heavy fine and long imprisonment. A standard of purity should be fixed by law, and officers, competent to determine the degree and character of adulteration, should be appointed to make analyses for the health officers in our towns and cities. We have stated in a previous section what that standard should be.

The milk act should be a part of a general law against the sale of adulterated food of any kind.

The other laws, bearing on the subject, are purely trade measures, and have for their object the prevention of dishonest competition in the milk trade, and are not intended to guard the public against unhealthful milk. These laws read as follows:

Act of April 5th, 1878: Every person who shall sell, or who shall offer or expose for sale, any milk from which the cream, or

any part thereof, has been removed, shall distinctly and durably stamp or mark, in letters not less than two inches in length, in a conspicuous place, above the centre, upon the outside of every can, vessel, or package containing such milk, the words "skimmed milk," and such milk shall only be sold or shipped in or retailed out of a can or other vessel so marked.

Violations of this act are punishable by a fine of $50. The sale or exposure for sale of milk contrary to this act is presumptive evidence. The non-payment of the fine is punishable by imprisonment.

Act of March 12th, 1880,—supplementary to the above act: The State Milk Inspector is appointed and empowered to open any can, vessel or package containing milk, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can to contain milk which has been adulterated, or from which the cream, or any part thereof, has been removed, the inspector is empowered to pour the contents of the can upon the ground, and bring suit against the person violating the law.

Any citizen may act as complainant under these acts.

It may not be amiss to look at the objects and bearing of these last two acts. Prior to the passing of the act of 1880, which created the office of milk inspector, there were laws, which, if enforced, were sufficient to check the sale of impure or adulterated milk; but the great trouble was found in having them enforced, consequently they were practically inoperative.

The history of these acts is pretty much as follows: The sale of milk was greatly interfered with by unprincipled dealers in different parts of the State, who shipped inferior or watered and skimmed milk, and obtained prices as high as those received by honest men who sent pure milk. To check this fraud, the act of April 5, 1878, was passed. This act, a purely commercial one, had for its sole object the prevention of dishonest and unfair competition. The law, which was copied from that of New York, was on the statute books for years, and not a single suit was brought under it, no person being found to act as complainant; the law being a dead letter for two years, it was thought, by the milk producers, that if some one person was appointed to look after their interest, at the expense of the State, the objects sought for would be obtained.

In accordance with these views, the act of March 12, 1880, which is supplementary to the previous one, was passed, and the office of State Milk Inspector created.

The two last acts protect the public against the sale of skimmed milk to a slight extent only. We have previously remarked that the supply of our cities comes from farms in their vicinity and not a large quantity from distant points, and that the bulk of the milk produced by dairymen is shipped to New York, hence the interests of our people in this case are secondary to those of the people of New York City.

We have, then, laws perfectly competent, if enforced and if modified to a slight extent, to check the sale of impure milk, in this State. It is not for us, in an article like this, to criticize the laws; it remains for others to alter the laws so that they cover the ground.

I.—INSPECTION.

We have thought it well to draw up a short scheme for the use of milk inspectors in making systematic examinations. A man to act as an inspector, must be a good judge of milk and, without the aid of any instrument, he should, from the taste, odor, consistence and appearance, tell whether the milk is a specimen of genuine milk or not. If he use the lactometer, this knowledge is especially necessary, for the lactometer is useless except in the hands of an expert. He must be conversant with the workings of the milk business, from the time the milk leaves the the cow to the time it is delivered to the consumer. He should likewise know the "tricks of the trade." It is well to be provided with a lactometer and lactometer glass, a floating thermometer and a number of four ounce bottles in which to put the samples.

Scheme.—The taste and odor should be noticed; upon rubbing the milk between the fingers it should give the feeling as if it had "body." Now stir the milk well, and take a sample from the centre of the can and put it in the lactometer glass; take the temperature if necessary; apply the lactometer; watered milk will run between between 80° and 105°; skimmed milk may mark from 110° to 125°. If suspicious, take a sample and label the bottle with all marks on the can and the date. An analysis may be made as follows: *Analysis.*—Take the specific gravity

in a 100 gram bottle; set for cream in a cool place and read off the per cent. in twenty-four hours, and notice any sediment.

Thoroughly mix the sample and weigh out five grams in a tarred platinum dish; evaporate on a water bath for three hours; dry and weigh. Loss in weight equals water; weight, less the weight of dish, equals total solids. Extract fat with ether or benzine; the loss equals the fat. Now ignite and when the dish is cool weigh; weight equals the ash

Test for adulterants, sodium, potassium and magnesium carbonates; borax, potassium and magnesium nitrate; sodium chloride; chalk, etc. The casein and sugar may be estimated after the fat is extracted, but this is rarely necessary.

Take a fresh sample and examine under the microscope. Note starch grains, blood corpuscles, pus corpuscles, colostrum corpuscles, Blyth's bodies, etc.

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CONTAGIOUS PLEURO-PNEUMONIA.

EZRA M. HUNT, M. D.

It has been the duty of the Secretary of the State Board of Health, for the past year, to have frequent correspondence with those who have to do with the diagnosis of contagious pleuro-pneumonia, and to aid in its investigation in this State. Few diseases of animals are as interesting as this is in its comparative study. It requires the acute analysis applied to the various zymotic diseases and needs to be traced also for the light which it may possibly throw upon epidemics. While a specific disease, it results almost exclusively in a local affection, so that it has to be treated much as a disease of the respiratory organs. Its one great lesion becomes the absorbing thought in the study of the disease, although this must not be to the exclusion of its study as to its constitutional effects. This is made all the more significant by the fact that inoculation in the flesh, as upon the ears or tail, not only will give the specific disease, but divert its concentration from the lung and at the same time secure immunity from attack. It is made benign, not so much by the local mildness, as is sometimes demonstrated by tailless cattle, but because it is thus diverted to another centre for its activity.

Without repeating the history of diseases, or relying entirely upon the text-book authorities, we purpose to seek an answer to the following questions:

Have the laws of its contagiousness or communicability been determined?

Are its lesions so distinct as that its diagnosis from all other forms of lung diseases can be determined from post-mortem appearance alone?

Do the thermometer or symptoms distinguish it from other lung diseases of cattle?

How are we to arrive at its diagnosis as an infectious pleuro-pneumonia?

What is the period of its incubation?

Can an animal that has fully passed the acute stage and returned to feeding, to milking and to apparent health, communicate the disease?

Question 1st.—Have the laws of its contagiousness or communicability been determined? It is first to be noted that much which is accepted as proof of contagion is not really such. Terms such as epizootic (epidemic) infectious, transmissible, etc., are confounded.

The secretions of a cholera patient or a typhoid fever patient may communicate the disease, but the person not, or neither may communicate and yet the secretions after voidence, standing and change, i. e. after a number of hours more or less may communicate the disease.

Or, as it is claimed in yellow fever, the patient may be harmless, while the things and surrounding (fomites) may communicate the malady.

Or, a disease may be in the atmosphere so that there is what is called an epidemic constitution of the atmosphere.

Or, like cerebro-spinal meningitis, it may prevail, not because one animal catches it from another, but because numbers are subjected to the same unfriendly influence.

Dysentery often prevails as an epidemic or endemic when it is not contagious.

The pathology of puerperal patients, so far as the peritoneum is concerned, is the same as the non-infectious form.

So a great deal of the average testimony as to the contagiousness or communicability of a disease, needs to be sifted and treated, not by the test of prevalence, or of seeming confinement to localities, but by close and exact evidence as to individual communicability.

It is generally believed by authorities that the form of pleuro-pneumonia of which we write is communicable from animal to animal, and also by the surroundings of infected animals. Although classified and tabulated facts arrived at by such methods of exclusion as exclude other possible sources of prevalence are too scarce as yet. The common sentiment and obser-

vation of veterinarians concludes it to be communicable through contagion.

The lines of its contagion are not very well defined. We have good reason to believe that most contagions are particulate, i. e. not gaseous but consist or reside in minute particles. Most of these are diffused slowly. The yellow fever poison seems to cling near the ground, and scarlet fever poison is not communicable to the same distance as measles.

There is some reason to believe that the ferment of the lung plague is not very diffusive, and that animals two hundred or three hundred feet distant are not in the area of the poison.

Are the lesions so distinct as that its diagnosis from all other forms of disease, or of local affection can be determined from the post-mortem appearance alone?

To an observer of a post-mortem where an animal is killed with pleuro-pneumonia and has one sound lung, the contrast at once convinces of something—one lung is say of two and a half pounds weight, the other cf twenty to thirty pounds. There is effusion of a liquid—there is a thickened pleura, both of the part next to the chest wall and of that covering the lungs. There is plastic exudation, both inter-pleural (L) and in the interstices of the connective tissue, which leads to organization and so gives to you all the solidity of fibrinous exudation. It is just this that constitutes the pathology or lesion of the disease. "All the other organs of the body are, as a rule, found to be in a state of health." There is variation in the amount and consistency of the watery or gluey fluid, after the plastic exudation so rapidly organizes as to bind down the pleura and lung so that you need to peel it from the chest wall.

The pneumonia is chiefly interstitial and magnified because of the abundant connective tissue in the cattle. Neymeyer's definition of interstitial pneumonia (vol. i, pp. 162 and 192) as an inflamation, involving the walls of the air vesicles and the inter-lobular connective tissue, "is fully descriptive as to kind." Only the amount is magnified because the bovine animal has so large an amount of connective tissue in the lung, and because the "pneumonic lobules are separate blocks of tissue." By the exudation and by the conversion of the inter-lobular tissue into granulative tissue and connective tissue, the lobules themselves pass to a stage of stuffing or impaction, and so you get necrosis or a strangulated death of the lung substance.

If the animal does not die, but goes on to recover, the dead portion of the lung becomes encapsulated or encysted by "the false membrane over the pleura, and the inter-lobular and peribronchial spaces."

Now in all this, as to the pathology of the lesion, so far as quality or method of change is concerned, we have nothing pathonomonic or distinctive of an infectious or contagious malady. As we read or study, side by side, the various changes that take place in pleuro-pneumonia, or chronic interstitial pneumonia, in the adult and in the animal, the terms of description and the records of lesion as to the character of the exudation, its organization, changes and results, it is hard not to come to the conclusion that Leaning does, that if there is a contagious pleuro-pneumonia in animals there is also an analagous infectious pleuro-pneumonia in adults, and between the two, as he finds them in the adult, he makes only such pathological distinctions as these. In one, the pneumonitis is the principal lesion; in the other, the inter-pleural plastic exudation. "He makes the essence of distinction to consist in the more excessive and intense hyperplasia of the blood, its tendency to throw out plastic or fibrous exudation being such that "wherever there is celluloid connective tissue there is plastic exudation."

While the medical profession generally recognize cases of common pneumonia, to which all these facts attach, it is significant that they regard it not as a contagious disease, although, at times, largely prevalent, but as a severe and malignant type of usual pneumonia, which is also generally a pleuro-pneumonia.

While some veterinarians have asserted to us that it is possible from the post-mortem lesions of the lung alone, to pronounce a case one of infectious pleuro-pneumonia, yet on presenting the specimens to five of the most eminent pathologists of New York City, three of whom have examined cattle lesions also, they plainly declared that while from the rapid plastic or pleuritic exudation and its "tremendous" rapidity of solidification, there might be grave suspicion and inference that the disease was specific, yet that the same pathological order of change was common and not distinctive. The very points that had been named to us as differential, where shown not so to be by those who believe in a contagious pleuro-pneumonia.

"Some have supposed the very extensive exudation into the

lung structure and its marbled appearance, are indicative of some specialty in the inflammatory process; this is not, however, the case, for it is found that ordinary pneumonia, caused by cold, induces the same anatomical condition of the pulmonary parenchyma—the peculiar appearance being due to the anatomical fact, that the lungs of horned cattle contain much connective tissue and that the air cells are separated into groups by such connective tissue."

Prof. Williams, of Edinboro', in his Principles and Practice of Veterinary Medicine, quotes Strangemayer with approval, thus:

'All this, however, is not intended to and does not discredit the idea of contagion. The same structural or tissue changes occur to an organ from causes totally different. So pneumonia, arising from very different causes, does not have lesions corresponding to the variety of causes. Puerperal fever, although so distinctly communicable, so far as the peritonitis is concerned, has no distinct lesions. Although the pleural adhesion and infusion are marked, yet common pneumonia is generally pleuro-pneumonia.'

Loomis has said that in pneumonia nothing is so frequent as adhesion of the lung to the pleura.

Prof. Janeway states, that in one hundred and twelve cases of post-mortem of pneumonia, only ten were found entirely free. While there is a field for the comparative study of the lesion, it is not chiefly as to its pathological distinctness.

The degree of lesion, the habits of the disease, the natural and physical signs and evidence of the source of contagion, must be sought as diagnostic. Then the effects of imparting the disease to other animals by inoculation from the diseased lung as a crucial test, are worthy of consideration. Where all such facts are weighed, studied and compared, we have the greatest respect for conclusions, but we must claim that from post-mortem appearances *alone*, it is seldom wise to assert a positive diagnosis. And we must also say, that diagnoses have sometimes been made with a facility and celerity appalling to any medical clinican.

Does the thermometer distinguish the contagious pleuro-pneumonia from all other diseases of cattle, and especially those in which the lungs are affected? The thermometer is merely a test

of animal heat, and as such is valuable only as a measure thereof. An excessive degree of temperature attaches to very many diseases and to none more than those of the lung. In the common pneumonia of men, it is not unusual to record a heat varying from 104° to 107°. If we find in a stable an accurate record for days of the heat, as in our hospitals, or as in the note book of private chemists, and are sure that with care as to thermometers and with all that precision which is so difficult with animals, and so exacting on the time, and nice observation of the attendant, that the record shows a very high temperature, this would aid in giving precision to the diagnosis, but not so as of itself to establish the disease. In a case in Camden county, in which nine animals died, the temperature was as high as 107°, but there was no lung lesion whatever, and the disease was not pleuro-pneumonia. How, then, is a diagnosis of the disease to be arrived at?

We have only to answer that it is by the history of the cases, the ability to trace the source of contagion, the natural and physical signs, the spread of the disease and the post-mortem appearances, by a summing up of all the facts in evidence. The rapidity of the fiterinous exudation and interstitial consolidation is an important index. An influenza, like the horse epizootic, may prevail and pneumonia may be epidemic without being contagious when real infectious pleuro-pneumonia is occurrent. There may also be cases of sporadic disease among cattle. The infectious disease is claimed never to occur spontaneously in this county, but always to originate from a previous case. If, therefore, there is no clew to contagion, it needs strong evidence to assure as to the specific nature of the disease. It is easy to arrive at a superficial diagnosis, and positive conclusions are made by men whose evidence would be cast out of any capable medical or veterinary court as incomplete.

WHAT IS THE PERIOD OF INCUBATION?

The period of incubation has not yet been accurately determined, but must be admitted to reach from ten to forty days, as a rule. We believe we have evidence of its occurrence three months after the purchase of an infected animal. This is the great difficulty in eradicating the disease. An animal may easily pass in an ordinary inspection, and yet be a conveyancer of

the disease. It is for this reason that we regard the usual inspections, as they have always been conducted, entirely insufficient to guard against the disease. Acute cases only are likely to be discovered, and drovers soon become wise enough not to bring these over by usual routes. While there should be full powers of inspection, this cannot be the sole or chief reliance. So long as pleuro-pneumonia exists in any part of any State, every man who brings any cattle in the State, should be required to define the locality from which they came, and give a certificate of health, and be held accountable for any outbreak in the animal for three months. All newly-purchased stock should be kept apart from the common herd. Any slight cough or other ill condition of health should be carefully watched.

Can an animal that has fully passed the acute stage, and returned to feeding, milking, and to apparent health, communicate the disease?

This is a most important question, since, over and over again, a quarantine has been continued, because of the assertion that recovered cattle are still dangerous. It has been assumed that any animal having once had the disease, may at any time after apparent recovery, become the focus of a contagion, and so infect other cattle. It is assumed that because an animal once affected, may continue to have one lung, showing that there has been disease in it, that, therefore, the "capsule walling up the diseased germs may break down, and the imprisoned germs escape, and so another outbreak occur." We submitted that point to an eminent medico-veterinary authority, who replied: Who saw the germs? Where is the record of one fact that any such case ever did break down and release imprisoned germs? Because a part of a lung becomes necrosed and encysted, that does not prevent recovery. We constantly have similar conditions in human recoveries. Nor does a lesion retain the specific character of the disease causing it. Caseous degeneration, or necrosis, or other changes resulting, are in fact always quite distinct from the original cause thereof. The suggestion that such animals may, at any time, become foci of contagion, is not supported by evidence.

Dr. Yeo, one of the best of recent authorities, says: "The exudates do not tend to become highly organized, but to change to a cicitricial tisssue, or degrade into lower forms of matter, i. e.

caseous or calcareous." We have seen, the last summer, cases which had been pronounced pleuro-pneumonia, and had recovered with signs of consolidated or necrosed lung; yet they were kept in close stables, and with numbers of other cattle. After a lung has thus passed into a necrosed or cicatricial state, there is no probability that by any outbreak it can again become the centre of a specific contagion. The reason why we advise the fattening and slaughter of recovering cases, is rather because there is danger of infection during the prolonged recovery, and because milch cattle are not likely to do as well with one lung, or a part thereof, permanently impaired. It would, at least, be worth while that some of these lungs which had been harmless for months or years, should have some of their juice inoculated into other animals, to see whether genuine infectious pleuro-pneumonia could be produced.

What are the laws and restrictions that are justifiable, and on what kind of evidence must the claims for their enactment rest?

We first claim that it is due that the presence, degree and type of infectious pleuro-pneumonia should be established by the most indubitable evidence, before severe restrictive measures are resorted to.

It is no longer enough that this or that authority give their opinions. They must state the grounds and evidence of their opinions so that other experts, too, may sift the facts and draw their conclusions. Or, at least, they must by former subjection to such tests have established their claims to speak *ex cathedra*.

We believe, therefore, first of all, that all states should in the case of this or other suspected contagious disease among animals, have its constituted authorities, with power enough to find out and decide and with diligence enough to give the grounds of their conclusions, in order that there may be reasonable evidence as to suspected contagions.

On satisfactory evidence thus furnished that any contagious disease among animals exists, isolation should be promptly secured, and such authority be granted as the communicability of the disease justifies.

It is important after such methods of test as are due alike to science and art and due to the owners and to their individual rights, that large powers should be given, since upon full authority and its exercise may depend the entire question of spread.

The rule in all contagious diseases is to give large police and sanitary powers and then hold officers accountable for their judicious execution. The man who always exercises power mainly because he has it, or who hesitates to exercise because of the opposition of interested parties, cannot be entrusted with such a law.

Large powers are only meant as discretionary powers, and where exercised beyond a limit which the facts in evidence justify, no class so abuse and misuse power as those who are largely entrusted therewith. The very confidence thus reposed in them is a declaration of a belief that they will act only upon evidence such as will be satisfactory to the common sentiment of experts which, in our country, always has, if not a full popular approval, yet a noble and sustaining constituency of those who are always ready to defer to the expressed statements, evidences and opinions of a majority of careful investigators.

Errors of judgment when they effect rights of property or life are as serious as if they were errors of financial cupidity or other ill-intent. This does not inculcate hesitancy in action, but it does include discernment both in resolve and execution and ability to defend action in a way satisfactory to the common intelligence of judges.

The peremptory slaughter of animals, their forcible detention and inspection in transfer, and the closing up of avenues of trade by summary ordinance are acts to be justified by the facts in evidence. Those that act promptly with good reasons, therefore, are to be commended; those who act upon grounds that will not stand the test of close examination are to be condemned, just in proportion to the magnitude of the trust committed to them. When a disease like pleuro-pneumonia is epidemic in any locality, large powers to prevent spread must be conferred and exercised. The welfare of animals is a large interest in the State.

The hygienic sanitary measures, necessary for their health and the prevention or limitation of contagious diseases among them, is among the clear duties of the State. It concerns not only a pecuniary or humanitarian interest, but bears directly upon the health of the people.

The laws which effect them are very similar to those that effect human health. It is found that the care of the one is quite a measure of the care to be extended to the other. In the matter

of epidemics, (epizootics) or contagions and the various laws of communicability or transmission, these diseases are of intense interest, since by these we may study all contagions.

It is evident to any one who examines a lung of an animal with acute pleuro-pneumonia, that it is so rapid in fibrous exudation and in interstitial consolidation, that the only hope of a case is in very early treatment and a profound impression upon the inflammatory and exudative process. Bleeding and large rapid doses of calomel, and later, counter-irritation after removal of the hair, need exact trial under testing methods. Milk, with lime water and defibrinated blood, may be easily and largely given by drench to meet any reduction from treatment which is less rapid than that from the disease. Cows' blood, stirred well while fresh, so as to remove the strings of serum, leaves a juice of great value for alimentation in such cases. If farmers would use such preventive treatment as we have indicated in circulars, and would have skilled veternarians examine affected herds, so as to see each case in its start, we are sure its extension could be limited.

In the last few years, biologists and pathologists and the medical profession have been most earnestly studying the laws of contagion and of the production, dissemination and virulence of disease, using comparative pathology and other comparative studies as a most important means of information. For this reason, in England and on the continent, medical men have been prominent as authorities on the disease of animals, and co-operate with educated veterinarians in their attempts to prevent disease. It is due to veterinary science and art that both alike take a very deep interest in these studies. It is due to the medical art that physicians utilize the large opportunities, thus furnished, for the study of the laws of health, of disease, of physiology and pathology, as they affect human kind.

We feel that in the study of the lung disease of cattle, of these blood poisons, and of such a disease as infectious pleuro-pneumonia, there is still a large field for investigation, in which, recently, such men as Dr. T. Spencer Cobbold and Dr. C. S. Roy, Dr. Leaming, etc., have added to the labors of Fleming and Williams and Law.

As pleuro-pneumonia, like most of the contagious diseases of

animals, does not, thus far, admit of much treatment, the chief service that the State can be is as follows:

1st. To diffuse information that shall enable owners to suspect contagion, and so separate the animals before others are infected. Also to acquaint them with methods of disinfection and disposal and of avoiding the carrying of the disease.

2d. To prevent the irresponsible introduction of cattle from infected districts, by inspection, by regulative laws, and by holding sellers responsible.

3d. To provide means for the disposal of animals that have the disease, so that centres of contagion may not be preserved.

4th. To guard against modes of keeping cattle which tend to cause ill-health and diseased milk supply.

5th. To authorize inoculation under State oversight in herds already affected where it does not readily subside.

The present law, with slight alterations, can be made operative for these purposes, and at moderate expense, unless sudden outbreak or introduction of a contagious disease should require especial expenditure. The details as to its former management and some other suggestions will be found in the record made for the Board of Agriculture, and published in their report for this year as required by the law.

REPORTS OF VETERINARY INSPECTORS.

REPORT OF WM. B. E. MILLER, D. V. S., DECEMBER 31st, 1880.

The subjoined report will show the number of places visited where diseased animals were reported, the number sick at time of inspection, the nature of the disease, and deaths resulting therefrom as far as known:

March 24. Visited Benjamin J. Lord's farm, Parkville, Gloucester county; found no chronic cases of pleuro-pneumonia. Mr. Lord had lost several, and had one killed by Gen'l. Sterling's order.

March 30. Found one animal sick with bronchitis in a lot of fat steers. Examined at the Camden stock yards. The animal was slaughtered by J. L. Pierson, butcher, of Woodbury, Gloucester county.

April 1. Visited E. A. Bloomfield's farm, Elizabeth, Union county; found one chronic case of pleuro-pneumonia. Had lost some and had others killed by the cattle commission of last year.

Same date. Visited Jacob C. Dodd's, farm Lyons Farms, Essex county; found three chronic and one acute case of pleuro-pneumonia. Had lost some and had some killed by previous commission.

April 2. W. Cohen, Old Small-pox Hospital, Hoboken, Hudson county. One sick, had lost some and had others killed by other commission.

April 2. Mrs. Schuler, Blun street, Union Hill, Hudson county. One chronic case. Had some killed by previous commission.

April 5. Found three sick steers in a lot of forty. Inspected at the Camden stock yards. Were slaughtered for beef. Came from West Philadelphia stock yards.

April 14. Visited Bergen county; found one chronic case—

on one of the farms where cattle had been killed by the previous commission. Informed myself as to other herds which had previously been in quarantine.

April 6. Visited Manasquan, Monmouth county, and examined a cow on the farm of J. H. Morris; found it an acute case of pleuro-pneumonia. Lost one on the 18th and one on the 19th of February; had no other cattle. Also visited the farm of Shem Pierce, of the same place, and found one sick with same disease; had lost one three weeks previous.

April 16. Mr. McMullen, Jersey City, Hudson county; one cow sick of parturient apoplexy; died.

May 12. John Whittick, Hightstown, Mercer county, had two infected with pleuro pneumonia from herd of J. C. Fisher, on adjoining farm, who had several deaths and some killed by the State authorities last year. No deaths in Whittick's as far as known.

May 14. Joel Barkalow, Forked River, Ocean county, lost one cow with pleuro-pneumonia.

June 28. Visited Englishtown, Monmouth county. John H. Laird had one cow sick; had lost one from indigestion.

Same date. William B. Congden lost one from parturient apoplexy.

Same date. George Morris had three sick with indigestion; no deaths as far as known.

June 29. Visited Freehold, Monmouth county. Abijah Applegate lost five cows within a few days of each other; did not think it any contagious disease. None sick at time of visitation.

July 1. Visited Farmingdale, Monmouth county. Many farmers were losing cattle from indigestion, owing to the dry weather. Found no contagious disease.

July 2. Visited Ridgway, Lakeview, White's Bridge and Toms' River, and found that nearly every farmer had lost cattle as the result of the excessive drought.

July 19. Visited Robertville and Matawan, Monmouth county, and found the same state of affairs as at other parts of the country—cattle dying by the dozens from indigestion.

July 20. Visited Mount Holly, Burlington county. J. Ewing had five cows sick with lung trouble; had lost two.

C. H. Deacon had two sick with pleuro-pneumonia; killed one at this visit; had lost some before; has since had many others killed by State Board.

The disease was brought to this farm by the purchase of a cow from Caleb Ridgway, cattle dealer, that came from the stock yards of West Philadelphia.

Mr. Gaskill and Mr. Southwick of Pemberton, both bought from same drove and had their herds infected. Mr. Kelley, of Masonville, also had the contagion brought to his herd from the same source, and had several killed.

July 26. Dr. Ashhurst, of Mount Holly, had one sick cow which was killed. Not pleuro-pneumonia.

July 28. Visited Clayton, Gloucester county, and examined the herd of E. J. Davis and others, found three cases of pneumonia.

September 8. W. R. Hylton, Wrightsville, Camden county, had four sick with pleuro-pnemonia, has lost or had killed thirteen in all, infected by a cow from Philadelphia stock-yards.

September 9. Visited Turkey, Monmouth county. One farmer had lost two cows; found three more sick.

September 13. Visited Rieglesville, Warren county; found hog cholera very prevalent. The mortality very great.

October 1. Visited Mount Holly and examined two horses for glanders.

October 15. Visited Mount Holly and slaughtered two horses belonging to Ashmead Deacon, previously condemned for glanders.

October 11. Visited Sicklerville and Williamstown, Camden county, and found hog cholera very prevalent and fatal. Two cattle had died from phthisis pulmonalis verminalis.

November 1. Visited M. C. Brownings, Ellisburg; found one sick cow; had lost one. Made several subsequent visits to this farm; lost nine cattle in all. Disease "typhoid fever."

November 5. Visited Mullica Hill, Five Points and Ewans' Mills; found two farms infected with pleuro-pneumonia. Edward R. Lacy lost two steers, and had two more sick with it. Mr. Heritage lost one. They purchased these cattle from a drove which came from the Philadelphia stock-yards about three weeks before.

December 7. Visited Salem county; found pleuro-pneumonia on three farms, one death had occurred, and one was slaughtered at the time of visitation, and a post-mortem made of the carcass. These animals all came from one drove recently brought from Philadelphia. No other deaths since, as far as I know.

December 9. Visited E. Tomlinson's, Kirkwood, Camden county. Found one steer sick with pleuro-pneumonia; slaughtered the animal, and made a post-mortem, which showed the lesions of the last stages of the disease. Revisited this place on the 12th, and found another sick, which was slaughtered immediately These cattle were purchased in West Philadelphia about six weeks before, and came from West Virginia for sale.

Your obedient servant,

WM. B. E. MILLER, D. V. S.

To E. M. Hunt, Secretary State Board of Health.

BURLINGTON COUNTY, STATE OF NEW JERSEY.

MOUNT HOLLY, January 15, 1881.

Gentlemen :—I have the honor to inclose for your information, a report of the disease known as contagious pleuro-pneumonia, in my district during the present year:

It first made its appearance on the farm of Mr. Caleb Wilkins, Fostertown, Burlington county, N. J., June 9th, 1880. He had bought the cow of Mr. Caleb Ridgway, Vincentown, Burlington county, N. J., the preceding March. She died June 11th, 1880. She had been separated from the herd as soon as found ailing, and the rest of his herd did not contract the disease.

I was next called, June 21st, 1880, to inspect a cow suffering from contagious pleuro-pneumonia, on William G. Deacon's farm, near Mount Holly, N. J. She came from the same drove about the same time. Mr. Deacon has lost sixteen head. The same day (June 21, '80,) I condemned a case for the Hon. Job H. Gaskill, on his farm near Ary's Mount, Burlington county, N. J. He also bought two cows from Mr. Ridgway's infected drove last spring. He has lost ten head.

Mr. Joseph Kille, Masonville, Burlington county, N. J., bought a cow of Mr. Ridgway, some time in March, and on the 25th day of June, I condemned her and three others, as suffering from this malady. He has lost seven head.

Mr. H. H. Troth, Rancocas, Burlington county, N. J., called me to inspect his herd on the fourth day of August, 1880. I condemned two cases, and one cow had died prior to my visit, he not knowing it to be the cattle plague. He bought two cows of Mr. Ridgway, from the drove. He lost seven head.

Mr. William E. Gaskill, Juliustown, Burlington county, N. J., called me September 4, 1880. Condemned one cow. We suppose his cows took the disease from Mr. Job H. Gaskill's, as they pastured in adjoining fields before Mr. Gaskill's herd was quarantined. He has lost seven head.

Mr. Joseph Lundy, Rancocas, Burlington county, N. J., pastured his cows in an adjoining field to Mr. H. H. Troth's, in the early part of the summer, and during the month of September, 1880, lost three cases.

Mr. Rowland Stokes, Rancocas, Burlington county, N. J., pastured some young stock on an unfenced meadow near where we had Mr. Troth's cows quarantined. Two of his heifers jumped in and mingled with the diseased ones; and November 26th, I slaughtered one heifer for him, making in all eight herds affected. Slaughtered by order of State Board of Health, forty-four head; died of the disease, seven head. Total loss, fifty-one head from June 9th, to December 7th, 1880. One other cow, not seen by me, on the farm of Daniel Emley, Mount Holly, was slaughtered by order of State Board of Health. Although the disease appeared in a very malignant and contagious form in this county, we seem to have it under control at present; but we must be vigilant, and adopt all precautionary measures to stay its progress. We were fortunate enough to not allow it to spread from farm to farm after we were apprised of its appearance, by our system of quarantine, except, in the one instance of Mr. Stokes' cattle, above mentioned. Mr. Caleb Ridgway, Vincentown, Burlington county, N. J., bought the drove in question, from a man in a Philadelphia stock-yard, not knowing them to be diseased, and sold them to the farmers in our vicinity. Thus this fatal disease spread, causing our farmers to suffer great losses. Regarding the causes, symptoms, different stages, &c., of the disease, it does not seem necessary to occupy any space in my report. After infection, death is the only remedy that will stop its progress.

One of the Township Boards of Health reported two cases of glanders, which were slaughtered by order of the State Board of Health.

Respectfully submitted by your most obedient servant,

C. K. Dyer, D. V. S.

REPORT OF J. A. MC'LAUGHLIN, D. V. S.

JERSEY CITY, JANUARY 1ST, 1880.

E. M. HUNT, M. D.,
Secretary, Board of Health of New Jersey.

SIR:—According to request I submit the following statement of work done by me since my appointment as cattle inspector.

June 9, 1880. Went to farm of Mr. Teese, distant about three (3) miles from Elizabeth, Union Co., found four (4) cases of pleuro-pneumonia contagiosa. Destroyed two (2); quarantined the remaining two (2).

June 25. Went to Mr. Donovans, Jersey City, Hudson county, found one suspicious case.

July 20. Examined eleven (11) head of Holstein cattle, at the Bremen pier, Hoboken, said cattle imported from Holland and the property of B. B. Lord, of N. Y.. All perfectly healthy.

August 11 and August 16. Went to Lower Hackensack, New Barbadoes; cattle the property of Mr. Gross. Found one cow suffering from *simple* pneumonia. After a thorough investigation concluded that contagious pleuro-pneumonia was not on his (Mr. Gross') farm.

September 8th. Went to the farm of Mr. Theo. F. Young, Andover, Sussex county. After a thorough investigation convinced myself that contagious pleuro-pneumonia was not among his herd.

September 16th. Went to the farm of Cooper & Hewitt, Mr. George, agent, Charlotteburg. After a thorough investigation satisfied myself that contagious pleuro-pneumonia was not among his cattle.

October 21st. Went to Preakness Valley to farm, (Old Stag Farm.) Found one sick cow showing other symptoms than those attending contagious pleuro-pneumonia. Found, also, one (1) cow on which I held a post-mortem. Conclusion arrived at: No contagious pleuro-pneumonia.

December 22. I examined two hundred and seventy head of Western cattle about to be exported per steamer "Persian Monarch," (agents Patton, Vickers & Co.) I mention this casually as showing the increasing business with the foreign markets, the result of increasing confidence, and none of these had any apparent disease.

VARIOUS CIRCULARS.

ISSUED BY THE NEW JERSEY STATE BOARD OF HEALTH, AND COPIES OF LAWS ENACTED BY THE LEGISLATURE, BEARING ON HEALTH, VITAL STATISTICS AND THE CONTAGIOUS DISEASES OF ANIMALS.

PROTECTION TO BATHERS.

JUNE 1, 1880.

Our statistics show that from July 1, 1878, to July 1, 1879, one hundred and ninety-three persons were drowned in this State. Some at the sea-shore, or by the capsizing of boats, some in ponds, many while bathing in rivers or small streams, some in pools or cisterns. Many of these were good swimmers. Not all of these perish from real drowning. Some have heart disease made fatal by nervous shock, others apoplexy or some intense congestion, others syncope from exhaustion. It is not easy to decide on the moment whether the drowning is from any of these causes, and it is better to proceed on the supposition that the case is one in which death *has occurred* from the shutting out of the oxygen of the air. Cases where the hands are clasped and the fingers contracted are the most hopeful. "Those capable of inhaling and retaining a large amount of air in the lungs, and those who retain their presence of mind in the greatest degree, are those who resist the dangers of submersion for the longest time and are the most readily revived, while those who force nearly all the air from their lungs at the first shock can seldom be recovered."

"When a person falls into the water or is exhausted by the act of swimming, he goes beneath the water, then again comes to the surface, aided by the buoyancy of the air in the body and in

the clothing. In coming to the surface, realizing danger, he instinctively assumes the upright position, springs from the surface, and throws up the arms for help, at the same time endeavoring to relieve the desire for breath, by an inspiration, and to express the desire for aid, by calling out. This effort takes in water as well as air, and produces a slight spasmodic cough during which act the body goes beneath the surface the second time. As the consciousness of sinking becomes more acute, there is an agonized expression of the countenance which is indescribable, but which, when once seen, will be ever remembered and recognized—and at the same time frantic efforts are made to grasp everything that can be seen, whether within reach or not, and this desire continues even after having sunk, as oftentimes bodies are found clutching the weeds, grass, or stones, that may be found at the bottom of the water."

"Sometimes the air is so exhausted from the system that the body does not come to the surface after going down the second time, but generally there is sufficient inflation to bring it once more to the surface, when as soon as the head comes above the water, the urgency to take the breath has become so great that a full inspiration is made without due caution, and a large quantity of water and a small quantity of air are taken into the system. The water penetrating into the bronchial tubes produces a second fit of coughing, expelling what little air may be left, and the body sinks just below the surface or goes to the bottom."

Five minutes under water is the usual limit after which recovery is improbable in a case of drowning, but as there is not always the same amount of air exclusion, as the time cannot always be accurately stated, as syncope or nervous shock may have modified the lung and air condition, and as there may be slight inhalation of air before it is perceived, no case not known to have been *under water* half an hour should be regarded as hopeless. Persons have been recovered who for an hour have shown no outward sign of life. Places frequented by boys for swimming, and all bathing places and life-saving stations, should have definite provisions for such accidents, and should be required by their patrons each year to state precisely what these appliances are,—and to show that they are in perfect order for instant use and under such direction as to be readily at hand. An accident ought never to occur without a full knowledge beforehand of how most rapidly to secure aid and appliances.

Printed guides in public places near the water serve both as information and warning. Methods and skill depend on speed for success. For details we refer to an article prepared for the New Jersey State Board of Health by T. G. Chattle, M. D., and to be found in our report of 1879.

In a case just occurring, the boat seeking the drowned one should have in it a person whose duty it is at once to take charge of the recovered body and not wait to land before doing anything.

When needing to be removed there should be at hand a stretcher on which to carry the body. Some one on the shore should be securing things needed.

The body should be carried with the face and front downward. One person each side with hands joined across the thighs, and with the others passed under the arm-pits to the head, will give the chest most freedom, and help to empty water, froth or mucus from the chest or stomach.

Discipline or readiness for the accident is the first and best promise of restoration. Order hot bottles, dry clothing, electric battery, hypodermic syringe or other provided apparatus to be brought and thus be ready with whatever the person directing may want.

HOW TO TREAT THE DROWNED; HOW TO SAVE A LIFE.

I. Cleanse the mouth and nostrils quickly and loosen collar, necktie and other clothing if you can, so as to get at waist and chest, but do not lose time at this.

Roll the body over upon the right side and so on over upon the face, the face resting on the bent right arm. Thrust your finger in at the angle of the mouth, and if you find the tongue fallen back, press or draw it forward. (The second or third finger of the other hand or a knot in a handkerchief will hold the mouth open while doing this if need be.) Then standing astride the body and clasping your arms around it so that the fingers of your two hands interlace just over the navel, raise the body by a slight jerk three or four times so that all but the head and feet clear the ground. This is to clear the stomach and windpipe, and will not take a half a minute.

II. Then turn the body on the back with the head as low as the body. Draw the tongue forward to one side of mouth and pass a lead pencil or stick as thick as the forefinger, in from the side

and across to the opposite back tooth, so as to keep the mouth a little open. (The stick will generally keep the tongue, or if not, it may be held.)

III. Then open the vest and the outer clothing so as to get nearer to the surface. If at hand, apply ammonia up the nostrils and inject with a hypodermic syringe a dram or teaspoonful of brandy or whisky every few minutes beneath the skin of the upper arm or shoulder, or let another do it while you work on at *artificial* respiration—

THUS: In order to fill the lungs with air, raise both arms slowly upward and backward until the hands are brought together directly over the head. Then, more quickly replace them at the sides.

To expel the air from the lungs:

Place one hand upon the navel and the other close above it; then press heavily upon the navel, at the same time with the other hand or fist push strongly inward and upward, taking off the pressure suddenly. Then repeat the arm movement, and so alternate on and on. One or two persons can do it.

Each time as the arms are drawn back dash hot water against the sides. During these movements some one else should wipe the hair with a towel and put on the head a dry woolen cap; take off the shoes and stockings and wrap the feet in warm flannel and apply the galvanic battery to the feet, thus aiding and yet not interrupting the work of the one in charge, who must be recognized as director.

If still there are no signs of life, *vary the arm movement*, and instead grasp the body around the chest and with the operator's arms under the patient's arm-pits, raise the body forward gently and quickly to a sitting posture, then lay it down again and press over the navel with the hands as before, and alternate by this method about six or eight times per minute and continue according to indications.

The galvanic battery is best applied to the side of the neck and chest walls, but at first, time must not be lost from these systematic efforts to induce artificial respiration. Lose no time, yet do not hurry so as to lose regularity, and do not wait for anything you may want.

Warm rubbing, warmth, ginger tea, hot coffee, champagne or wine, beef tea and egg should be ready for use if there is resusci-

tation and ability to swallow. A portable bed should be at hand so that in transfer to a building there may be no exposure but a recovery of animal heat. As some die in secondary shock after apparent revival, this must be guarded against by quiet, warmth, food and rest.

How to keep the tongue from falling toward the windpipe and so impeding respiration.

Feel with your finger where the tongue is when you put in the pencil or stick and press it down and forward. If you have no one to hold the tongue you need not hesitate to pass a large pin or a small hook through its end, which does no harm and can be passed on through afterward by taking the line off of it. If the stick is passed in at one angle of the mouth across to the back tooth of the opposite side, and raised a little, that pries open the mouth, and the tongue can be worked or pulled well forward or out at the angle of the mouth and held by a handkerchief over the fingers if need be.

How to use the hypodermic syringe.

Remove the nozzle and fill it with brandy or whisky as you would a small syringe. Pinch up the skin and insert horizontally so that it pierces through the skin. Then push the piston down till the barrel of the syringe is emptied of a teaspoonful. A physician may add to the first or second injection the $\frac{1}{50}$ of a grain of digitaline, or six drops of the tincture or three of the fluid extract of digitalis. A drop of the fluid in the syringe should always be forced out before insertion, so as to have no air forced in.

How to use the electric battery.

Have a small Faradic current battery. Mix a little water with a half teaspoonful of the bisulphate of mercury, or, if out of it, use any strong acid, and put it in the metal cup. Then see, by holding the tin handles, one in each hand, that the battery works strongly. Apply one handle closely at the side of the neck and the other at the pit of the stomach. Move the latter handle around and between the ribs of either side and at the ticklish points at each side under the ribs. A battery should be kept at every bathing place. Use it as early as you can. A good hand battery, such as Grenet's, can be had for ten dollars.

TO HOUSEHOLDERS, CITY AUTHORITIES, BOARDS OF HEALTH, ETC.

I. *Look to the Condition of your House.*—Begin at the cellar or basement. Have nothing there that can decay, or that causes foul odors. If damp, let in air or sunlight, or drain the surroundings if needed. If by cleansing, by whitewash or by repeated airing there is not agreeable air, speedily use some of the disinfectants recommended.

II. *Look to the Kitchen.*—Let all sinks be kept sweet by scrubbing—by hot water poured down each day, or by use of disinfectants if needed. If outside there is an opening to the air, so that the kitchen sink is not the chief air outlet to a cesspool or sewer so much the better. Be careful that all slops or offalling from kitchen or laundry work is soon conveyed away, or disinfected at once, and not made to become a part of any heap or mass of impure matter. Cleanness cannot come out of uncleanness. Such things rapidly vitiate air, and discomfort, sickness or death result. Dirty water of any kind is even worse than dry filth. Secure cleanliness if you would secure health.

III. *Have the Dwelling and Sleeping Rooms well aired each day.* Closed closets, unshaken bed clothing, windows open and curtains down will not secure rooms fit to live in, or sleep in. *Flush* the room with air and let this, with sweeping and dusting, remove the organic particles which otherwise constantly accumulate and cause foulness. Chamber slops and wash-water are very innocent if cared for within six hours, but soon after decompose, and in sickness or very hot weather, sometimes sooner. If there are water-closets or stationary wash-basins in your house, be sure that they are not the foul air inlets to outside cesspools or sewers. Have good traps, good outside ventilation, good caution as to smells and use disinfectants for temporary purposes until you can remedy radical defects. Look to unoccupied rooms and the attic so that all may be dried and well aired, and that you may secure as much coolness and ventilation above you as possible, and not have an unventilated hot air chamber near the roof.

IV. *Know as far as you can that your Water and Ice Supply is Pure.*—Use no water from wells where surface soil is foul or where organic matter can reach, or from cisterns exposed to foul

air, as water will absorb foulness. If the water has any odor while heating in a glass tube, or if it becomes turbid or emits odor on being shaken after being kept a day in a long glass bottle, half full and corked, at once suspect it. If you must use it, have it boiled, and when cool, air it by pouring from one pitcher to another, and use it thus until you can be satisfied as to the purity.—See in full our First Annual Report, pages 83-4.

V. *See that the Food supplied for your Family* is in proper condition before cooking, and that it is prepared in a wholesome way.

VI. *Look to the Out Door part of your Home and that it is kept in Proper Order—that no water or decomposing matters are thrown upon it.*

If there is a cesspool it must not smell where it is disconnected with the house or has access to the air. If it does, it must be disinfected until radical change can be made. If there is an ordinary outdoor privy have free access of air to it, and exclusion of all slop or rain-water from it. If there is odor from it, use odorless disinfectants until it is corrected. If too foul for use cover it over with "calx powder," and have under the seats some receptacle, such as the patent pail, or a half barrel, or tub, which can be frequently removed and alternately replaced by another. A privy built above ground, with water-tight receptacle, by the use of dry earth, powdered wood charcoal, dry sifted ashes and occasional copperas water, is easily kept neat and clean, if cleansed each spring and fall.

Country homes need inspection and circumspection. Their sanitary care is often greatly neglected by nice people.

VII. *Insist that your town, if you live in one, have thorough sanitary inspection.*—Where persons are housed closely to each other there cannot but be evils from which the community has a right to be protected, and yet from which each one cannot protect himself. There will be householders who, from thoughtlessness, ignorance or poverty, do not secure for themselves or for others the needed sanitary conditions. Charity, the public welfare, and the necessary incidents of city life require regulated and definite provision against all those nuisances which imperil the life and health of the populace.

Insist upon systematic prevention, instead of waiting for that

loss which disease always involves, when it is artificial, or when we are compelled to meet an epidemic hurriedly.

If your authorities do not act, move by voluntary associations, which shall exhibit the facts and so compel action.

There is no waste so great as that of preventible disease, which disables not only the sufferers, but puts a tax on labor, capital and life much more direful than a well directed expenditure to prevent it. Epidemics are to be dreaded, but our greatest losses are from a chronic death and sickness rate which has a permanent base of supply in prevalent insanitary conditions, not prevented, not remedied as they should be and can be. Public health is common wealth. Can you not do something to reduce the tax levy which forced diseases impose upon the citizens of your city, township and State? To the degree that sickness and invalidism is unnecessary, it means hard times and ill-content. Every motive of comfort and interest requires that we plan to prevent all those ailments which are within the range and duty of our control.

DISINFECTANTS, AND HOW TO USE THEM.

Draughts of air for all floating foulness.

Dry rubbing for all easily detached foulness.

Wiping and water scrubbing for all attached foulness in most cases admit of no effective substitution.

Submersion in boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method; and dry boiling heat or freezing cold will also neutralize infective particles.

To disinfect a room, ship or building so needing disinfection that its contents and surfaces cannot be easily dealt with singly; close the room or building, its windows, doors and chimneys so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it on an iron plate or other metallic dish, and set this on a pair of tongs, or other crossbar, over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. A pound and a half of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of

the air into sulphurous acid, and all organic particles are likely to be changed. Keep closed three hours after the burning has ceased, and then air well six hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterwards.

Chloride of Lime.—A valuable disinfectant, chiefly because it contains from 30 to 35 per cent. of chlorine, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. It is not overrated as a disinfectant if only its quality is known, and its mode of use is judicious. It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

Chlorinated Soda.—Usually known as Labarraque's solution, is a convenient liquid preparation, valuable for use in saucers in the sick room or in utensils. Its odor should be perceptible to strangers entering.

Lime—Plaster—Charcoal—Dry Earth—Sifted Ashes.—All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry fresh charcoal and two bushels of stone lime, and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it. Quick lime and ground plaster should not be used where they may be washed into pipes and form lime soap or obstruct by hardening.

The Metallic Disinfectants.—Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, to be sprinkled freely in drains, cesspools, privy closets, soiled vessels, or heaps of decaying matter which cannot be removed at once. One half of the strength will do where it is to stand in contact with surfaces or in spittoons, water-closets, house vessels or vaults.

One half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sul-

phate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect.

Soiled garments may be put to soak in a half pound of sulphate of zinc (white vitriol), to three gallons of water. It will not stain or discolor most fabrics. One ounce of chloride of lead dissolved in a pint of hot water, and then a pailful of water added, into which a handful of common salt has been thrown, serves a similar purpose. Also a half ounce of permanganate of potash to a gallon of water.

For washing, soiled garments should be put in boiling water, unless the character of the fabric forbids it. Powdered borax, one quarter of a pound to a gallon of water, is a good cleanser of clothing. Soiled hair, brushes, etc., are cleansed by it. Chloride of zinc, one quarter of a pound to a gallon of water, does not stain or discolor fabrics.

Parkes recommends two ounces of chloride of lime, or one ounce of sulphate of zinc, or one half of a fluid ounce of chloride of zinc, to be added to each gallon of the boiling water in which the garments are thrown. On clothing that cannot be washed, and does not need to be burned, after thorough shaking and airing, the sulphate of zinc or chloride of zinc solution may be sprinkled.

For general disinfection, the following compound is available and valuable, and far better than most of the patented articles offered:

Sulphate of iron (copperas), forty pounds.

Sulphate of lime (gypsum or plaster), fifty pounds.

Sulphate of zinc, (white vitriol), seven pounds.

Powdered charcoal, two pounds.

Mix well, and scatter dry or wet it in small quantities, and make into balls ready for use. Where a liquid is needed, stir in water in the proportion of a pound of the powder or ball to a gallon of water, and sprinkle where needed.

Carbolic Acid is valuable as an out-door disinfectant, to be added to the sulphate of iron solution or used separately. Because of its own odor we cannot well test its effect in correcting other smells. We would test specimens or use only Squibbs

Liquid, No. 1, because sure of its strength, to be diluted by adding from fifty to one hundred parts of water, according to the mode of its employment. It is seldom required if the other articles named are properly used. Carbolic acid and chloride of lime must not be used together.

Remember that we do not know that any chemical disinfectants destroy the germs of a disease.

They only neutralize or suspend the action of those artificial disease producers or fertilizers, which the bad administration of cities or householders, or interference with natural laws or neglect of cleanliness has provided. We are to rely on these palliatives or correctives only while we are preparing for radical methods of prevention.

N. B.—The only reason why the death rate of your city or your township is over 15 to the 1000, or why the sickness and invalid rate is a large multiple of this, is because you are the victims of nuisances which admit of abatement.

PRESENT WHOLESALE PRICES OF DISINFECTANTS.

Sulphate of Iron (Copperas, Green Vitriol), 1½ cents per pound.

Sulphate of Zinc (Vitriol), 6 cents.

Chloride of Lime (in bulk), 2 cents per pound; in packages, 6 cents.

Sulphur Roll, 2½ cents per pound.

Carbolic Acid (No. 1 Squibbs), 30 cents per pound.

Zinc and Carbolic Acid, disinfectant of N. Y. Board of Health, 40 cents per gallon.

Permanganate Crystals, $1.10 per pound.

50 per cent. solution Chloride of Zinc, 25 cents per pound.

Solution of Chlorinated Soda (Labarraque's), 10 cents a pound.

SANITARY APPLIANCES.

TRENTON, N. J., May, 1880.

In the practical applications of sanitary science, it has become necessary to use very many appliances, both for convenience and to guard against evils incident to household and city life. These inventions have become far more numerous and useful than is generally known. To afford the people a better opportunity to

become acquainted with their merits, both by personal examination and by the opinions of experts, the State Fair of New Jersey and the State Board of Health last year united in an exhibition of sanitary appliances. Although it was the first of the kind attempted in this country, it was so highly successful as to lead us to make it a permanent and prominent feature at this great annual gathering of our citizens. This fair is held for a week each year, only a few miles from New York City, near Newark, and on the direct route to Philadelphia and to the south and west. The attendance from this and other States is very large, and it affords the best opportunity for familiarizing the people with valuable improvements. It opens this year September 20.

Specimens, models or drawings may be sent either as competing for premiums or for exhibit. Every article should bear a descriptive label, containing detailed information respecting its construction, use, retail price, and the place at which it can be obtained. There is no charge for space. Facilities will be afforded for those who desire to show any apparatus in actual working. Articles must bear the name of the owner or agency exhibiting. The small cost of conveying goods to and from the fair must be borne by the exhibitors. Letters of inquiry may be addressed to E. A. Osborn, C. E., Middletown, N. J., or to State Board of Health, Trenton, N. J. Articles sent for exhibit in our care should be directed "New Jersey State Fair, Waverly. Care of New Jersey State Board of Health."

The State Board of Health has commenced at Trenton, the capital of the State, a museum of sanitary appliances, to which any owner or manufacturer may present the articles exhibited as the property of the State, for permanent examination and exhibit. Or they will, by us, be directed to the persons or agents with whom they are to be left.

ADDITIONAL FOREIGN CIRCULAR.

It is also our desire to secure from foreign inventors and dealers specimens of the most approved appliances. It is the best opportunity that can be afforded in this country for extending their sale. Already the foreign press has noticed some valuable features of our last exhibit. No pains will be spared to do full justice to each article sent. Any article donated will be placed in the Museum or disposed of as otherwise ordered. Persons wishing to establish agencies in this country will be directed to

responsible agents, who can furnish full reference. Any articles sent to our care, as herewith directed, may be consigned through Morris' express, 50 Broadway, New York, or through other agents. Expenses of transfer from the New York agency to the fair grounds will be paid for here. We can assure exhibitors of careful attention to the merits of each article.

By order of the State Board of Health.

EZRA M. HUNT, M. D., *Sec'y.*

☞Note.—The N. J. Express Co. delivers goods on the grounds.

OFFICE OF N. J. STATE AGRICULTURAL SOCIETY,

No. 764 BROAD STREET, NEWARK, N. J., May, 188 .

The Sanitary Exhibit of the New Jersey State Agricultural Society, which holds its Annual Fair at Waverly Park, on Pennsylvania Railroad, between Newark and Elizabeth, September will be under the superintendence of the New Jersey State Board of Health. In addition to the catalogue premiums in classes, we will also confer decorative medals for the best exhibit in each of the following groups:

1st. Ventilating and Smoke-consuming Appliances.

2d. Water-supply Apparatus, Filters, Sanitary Conveniences and Disinfectants.

3d. Sewage Conductors and Receptacles, Tanks, Cesspools, &c.

4th. Water-closet and Emptying Apparatus.

5th. Life and Labor-saving Apparatus.

A suitable building, supplied with water, is provided, and the actual working of ventilators and various other appliances can be shown.

It is intended to make this exhibit an attraction at our Annual Fairs, so that all may become acquainted with the best sanitary arrangements, and inventors and dealers have a good opportunity for comparing and testing apparatus. When necessary the Judges will order trial, and postpone award until satisfied.

WM. M. FORCE, Rec. Sec.	AMOS CLARK, JR., Pres't.
E. M. HUNT, M. D.	E. A. OSBORN, C. E.
A. D. NEWELL, M. D.	W. M. FORCE.
E. DUNN.	J. C. BAYLES.

PHINEAS JONES.

☞Note—The N. J. Express Co. delivers goods on the grounds.

LAW AS TO BOARDS OF HEALTH, VITAL STATISTICS, &c.

An act entitled "An act concerning the protection of the public health and the record of vital facts and statistics relating thereto."

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That every city or borough or incorporated town, or any town governed by a commission, shall have a board of health of not less than five or more than seven members, of which the keeper or recorder of vital statistics, and also one city physician and city health inspector shall be members, if there be such officer or officers; and the said board of health shall be nominated by the mayor and approved by the common council or other governing board of the city, borough or town, to serve for not less than three years, but not more than three of the number shall go out of office at any one time, unless in case of removal by death or change of residence.

2. And be it enacted, That all cities of over ten thousand inhabitants shall have one or more city health inspectors, who hereafter in any new board, or in any case of vacancy, shall be appointed by the board of health.

3. And be it enacted, That in each township of the state outside of city limits, the township committee, together with the assessor and the township physician, if there be such an officer, shall constitute the board of health for all of said township outside of any city limits, and shall have the same powers as are possessed by any city board of health within the state, so far as they could relate to any unincorporated district.

4. And be it enacted, That every local board of health of any city, borough, town or township shall, on or about the first of October of each year, in addition to any other reports that the local authorities may require, prepare an annual report of the condition of the public health in their district, stating, also, any special causes of deterioration of health or hazard thereto, and shall therein answer any inquiries which have been addressed to them by the state board of health; in the case of cities the same shall be presented to the city authorities, and the board of health shall, on or before October fifteenth of each year, forward a copy

of the same to the address of the state board of health at Trenton; and in the case of townships, a similar report, signed by the chairman of the township committee, shall, by the same date, be sent as herein provided for city boards.

5. And be it enacted, That boards of health of cities or townships or any county health board shall, through the keeper or recorder of vital statistics, take cognizance of any neglect of returns on the part of any persons charged with this duty under the laws of this state, and are authorized to pass ordinances additional thereto, and not conflicting with the same; and they shall have the same powers of action for neglect as is given to the state board of health, and in addition, in the case of the failure of any city clerk, assessor or physician to make full returns as required by law, may bring action for the same and recover for the use of said city or township to the amount not exceeding fifty dollars; and in case of the death or removal of any assessor before the time for electing a successor, the township clerk shall take charge of and report such returns until the election of an assessor.

6. And be it enacted, That the state board of health, in making inquiries and investigations in regard to the causes of disease and mortality and the modes of their limitation, may aid any local board to the amount of twenty dollars in any one year, and that for this purpose, and also for extending its own inquiries into the sources of physical deterioration or local causes of disease, the board be authorized to expend two thousand dollars each year, in addition to the amount heretofore provided, said expenditure to be accounted for each year by itemized bills, audited by the president and secretary of the board of health and approved by the governor, and then shall be paid as other accounts of said board.

7. And be it enacted, that the board of health of any borough, incorporated town or township, shall examine into all nuisances, foul or noxious odors, gases or vapors, or causes of ill health or disease that may be known to them or certified to them by three or more freeholders or tenants, as in their opinion injurious to the health of the inhabitants within their township, or in any such vessel within any harbor or port of such city, borough, town or township, and shall deal with the same as in the manner herewith directed, to wit: whenever such nuisance or

source of noxious odors, or cause of ill health or disease, shall be found on public property or on the highway, the person or persons officially in charge thereof as overseers, civil officers, directors or trustees, shall be notified to cause the same to be removed as the case may require; and if failing so to do the procedure shall be the same as hereinafter provided in the case of private individuals.

8. And be it enacted, That whenever such nuisance, source of foulness or cause of sickness hazardous to the public health, shall be found on private property, that the board of health of the city, town or township in whose limits it may be, shall at once notify the owner at his own expense to remove the same within such time as said board shall deem the public health to require, a duplicate copy of the notification being also left with one or more of the tenants or occupants; if the owner resides out of the state and cannot be reached with notice speedily enough for the necessities of the public health, a notice left at the house with the tenant shall suffice; if the owner thus notified shall not comply with such notification or order of the local board of health within the time therein specified, said board shall proceed to remove said nuisance, source of foulness, or cause of sickness hazardous to the public health, and all expenses incurred thereby shall be a lien upon the property of the owner of the real estate or building on which the nuisance has occurred, for which he may have action against any person or persons who have caused or allowed said nuisance; and it is also provided that the property owner shall have the right under his notification, of speedy reference to the state or county board of health acting in a body or through its executive officer, within such time as the local board of health shall on his application direct, unless in its judgment the danger to the public health is too immediate to admit of delay; and in case any injunction or stay of proceedings in any form is applied for, such injunction or stay of proceedings shall not be issued until the local board and the state board have been notified to appear and be present at such hearing; but the failure of the owner to cause removal, or the refusal of the court applied to, to grant a stay of proceedings, shall not prevent the party or parties making the application from any suit at law and recovery of damages, if the alleged

nuisance be shown to have been in no way hazardous or prejudicial to the public health.

9. And be it enacted, That in order to secure the preparation of such tabular classification and deductions therefrom as bear upon political economy, population, the causes of disease and of epidemics at the time of indexing the records of marriages, births and deaths, there shall also be made a full transcription of such vital facts as are required for such purposes, and the allowance toward such transcription, and for the indexing of the records, shall be five cents for each return, payable in the same way as heretofore provided for the index record but the amount to be paid to the registrar or others for this clerical service, shall be determined by the state board of health, and the medical superintendent shall render to the secretary of state and to said board yearly an exact statement of the whole amount thus received and how expended, and the balance, if any remaining, shall be paid over to the state board of health and its expenditure accounted for through account audited by the president of said board and approved by the governor.

10. And be it enacted, That at the enrollment of the children each year by the clerks of district schools or by other proper officers in cities, inquiry shall be made as to how many of the children within the school age are unvaccinated, and the same shall be designated by a mark on said roll, and in the case of any found unvaccinated whose parents desire them to be protected from small-pox, but who, in the judgment of the board of education or the trustees of the school district, are not able to pay therefor, the school clerk or other authorized person may give to said child or children a permit to appear at the office of any regularly licensed physician of said school district or of said township to be vaccinated, and any such physician, on the presentation of such permit, with his certificate appended thereto that the said vaccination has been by him successfully performed, shall be entitled to receive from the township committee or city treasurer fifty cents for every such certified case.

11. And be it enacted, That in case of any county having a county board of health or vital statistics, nothing in this bill shall change or modify their former power or jurisdiction and they shall possess all the authority herein granted to city or township boards; and they shall yearly report to the state board

of health as to the cities and townships of the county, in the same way as is required in counties where there is no county board of health; they shall be the sole power to make ordinances in relation to the public health and to carry out the provisions of the laws of this state in reference to the registration and returns of vital statistics, in their respective counties nothing in this act shall relate to or effect any boards of health now organized in any of the cities of this state under the provisions of their respective charters.

12. And be it enacted, That this act shall take effect on the first day of April, one thousand eight hundred and eighty.

Approved March 11th, 1880.

EXPLANATORY CIRCULAR TO CITIES AND TOWNSHIPS.

April 1st, 1880.

The recent Legislature passed some acts which have important bearing upon the care of the public health. We shall quote such parts and sections as require early attention on the part of communities.

I. " An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto."

Sections one and two are as follows:

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That every city, or borough or incorporated town, or any town governed by a commission, shall have a board of health of not less than five or more than seven members, of which the keeper or recorder of vital statistics, and also one city physician and city health inspector shall be members, if there be such officers; and the said board of health shall be nominated by the mayor and approved by the common council or other governing board of the city, borough or town, to serve for not less than three years, but not more than three of the number shall go out of office at any one time, unless in case of removal by death or change of residence.

2. And be it enacted, That all cities of over ten thousand inhabitant shall have one or more city health inspectors, who

hereafter in any new board, or in any case of vacancy, shall be appointed by the board of health.

These two sections are afterwards limited so as not to compel any city that already has a Board of Health, organized according to a mode prescribed in its charter, to be changed. But it is mandatory as to all others, and also as to those cities which have nominal Boards of Health or Health Committees, whose mode of construction is not specified in their charters. An Inspector is required in all cities of over ten thousand inhabitants. It is also desirable that those cities which, by their charters, have the construction of their Boards of Health defined, should conform to the general method and spirit of this law as far as their charters permit.

Sections three and four are as follows:

3. And be it enacted, That in each township of the state outside the city limits, the township committee, together with the assessor and the township physician, if there be such an officer, shall constitute the board of health for all such townships outside of any city limits, and shall have the same powers as are possessed by any city board of health within the state, so far as the same could relate to any unincorporated district.

4 And be it enacted, That every local Board of health of any city, borough, town or township shall, on or about the first of October of each year, in addition to any other reports that the local authorities may require, prepare an annual report of the condition of the public health in their district, stating, also, any special causes of deterioration of health or hazard thereto, and shall therein answer any inquiries which have been addressed to them by the state board of health; in the case of cities the same shall be presented to the city authorities, and the board of health shall, on or before October fifteenth of each year, forward a copy of the same to the address of the State Board of Health at Trenton; and in the case of townships, a similar report signed by the chairman of the township committee, shall, by the same date, be sent as herein provided for city boards.

Under this law the township committee, the assessor, and the township physician, if there be one, are directed soon after April first, to organize as a Board of Health. They will then please notify this Board of the Post Office address of each member. In the meantime we shall send a Township Health Book to each

assessor for the use of such Township Board. Cities should have a similar Health Book. The general duties of the Board are to guard against preventable causes of disease, and to seek to prevent the spread of disease. The Town Health Book should be kept by one of the members. Generally either the assessor or township physician have most correspondence with the State Board and the Bureau of Vital Statistics.

On the first page of the Health Book give name of township, its number of square miles, its population by the census of 1880, white and colored, male and female, number under twenty-one, and number between school ages if possible. Repeat each year as far as necessary.

Any prevalent sickness, such as periodic or malarial fevers, whooping cough, etc., should be noted, even if few or no deaths have occurred therefrom. Also any prevalent diseases among animals and their fatality.

The condition of school-houses or other public buildings should be noted.

Where there are villages in the township, special note should be made of any insanitary conditions.

Any cases of complaints of nuisances or evils injurious to health should be recorded, together with the action of the Health Board thereupon.

A copy of the report made each year to the State Board of Health should be transcribed. As the State Record of Marriages, Births and Deaths extends from July first of each year, the yearly entry thereof should begin with that date. For convenience of comparison, some prefer to divide it into two periods of six months each.

The report sent yearly to the State Board of Health should also relate to the period from July to July, with an appended note at the close as to anything very special in the three months just preceding the report.

Food or fruit production may be briefly noted, as bearing on health condition. All such brief data are very valuable for after study as well as for present knowledge.

The following is a schedule of some of the subjects as to which reference and report are needed:

SCHEDULE.

A. Location, population and climate.
B. Geology, topography and contour.
C. Water-supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Houses and their tenancy.
G. Modes of lighting.
H. Refuse and excreta, (how managed.)
I. Markets.
J. Diseases of animals.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Schools and school and other public buildings.
N. Alms-house, hospitals and other charities.
O. Police and prisons.
P. Fire guards.
Q. Cemeteries and burial.
R. Public health laws and regulations.
S. Registration and vital statistics.
T. Quarantine or care over contagious diseases.
U. Sanitary expenses.
V. Heat and ventilation for dwellings.
W. Diseases of the year.

It is well to keep a yearly record of tempera ture and rain and snow fall, such as this:

Table of Temperature and Rainfall at———, from January 1, 18—, to December 31, 18—, by———.

MONTHS.	Minimum Temperature.		Maximum Temperature.		Mean temperature of month.	Fair on days.	Snow on days.	Rain on days.	Total rain and melted snow. (Inches.)	Monthly mean of rain and melted snow in previous five years.
	Date.	Degree.	Date.	Degree.						
January	8	9.50	22	48.25	31.00	18	5	11	6.445	3.812
February	4	8.00	28	55.75	33.24	16	2	6	4.960	3.292
March	28	17.25	10	67.00	45.16	18	3	13	3.035	4.958
April	6	40.00	21	78.50	55.55	15	0	8	1.730	4.823
May	14	39.00	26	85.00	60.73	21	0	9	4.205	2.432
June	6	48.75	30	93.25	68.20	18	0	8	2.446	2.677
July	23	61.50	3	98.25	78.25	18	0	11	4.330	5.172
August	26	55.00	9	90.50	73.09	17	0	10	8.060	6.189
September	28	43.75	1-2	88.00	67.47	17	0	10	2.535	4.701
October	29	35.00	2	76.75	56.41	23	0	8	2.823	3.628
November	15	27.00	12	58.00	42.65	18	2	9	4.570	4.569
December	25	13.50	1	57.75	31.83	20	6	7	7.459	2.265
Means and Totals	Feb. 4.	8.00	July 3.	98.25	53.63	219	18	110	54.363	....
Previous five years	Jan. 4, 1873.	12.00	July 26, 1877	99.00	50.48	227	30	97	48.499	....

Thermometers in the shade, having a northern exposure, protected from reflection.

Thus the coldest and hottest days, and the mean temperature for the year and for a series of years is easily referred to.

The Board should meet in April and the last of September, and as much oftener as needed on the call of the chairman.

The first report to the State Board of Health, in October, should give items as to most of the schedule subjects, and a full idea of present conditions. Afterwards, from year to year, each subject may be presented in its due proportion of importance. Either the township physician or some other medical man will prepare or aid in the outline.

Section five is as follows:

5. And be it enacted, That boards of health of cities or townships or any county health board shall, through the keeper or recorder of vital statistics, take cognizance of any neglect of returns on the part of any persons charged with this duty under the laws of this State, and are authorized to pass ordinances additional thereto, and not conflicting with the same; and they shall have the same powers of action for neglect as is given to the state board of health, and in addition, in the case of the failure of any city clerk, assessor or physician to make full returns as required by law, may bring action for the same and recover for the use of said city or township to the amount not exceeding fifty dollars; and in case of the death or removal of any assessor before the time for electing a successor, the township clerk shall take charge of and report such returns until the election of an assessor.

Localities should not only secure general returns of vital statistics, but, from year to year, study deaths and the causes of deaths in certain localities, and obtain information as to healthy and unhealthy situations. When the figures are entered side by side for five years or more, they often guide in identifying local evils.

The Health Board must now see to it that ministers, physicians, etc., do not neglect a duty which is a part of their service. The law passed this year exempting physicians from jury duty more than compensates for the time and trouble.

Section six is as follows:

6. And be it enacted, That the state board of health, in making inquiries and investigations in regard to the causes of disease and mortality and the modes of their limitation, may aid any local board to the amount of twenty dollars in any one year, and that for this purpose, and also for extending its own inquiries

into the sources of physical deterioration or local causes of disease, the board be authorized to expend two thousand dollars each year, in addition to the amount heretofore provided, said expenditure to be accounted for each year by itemized bills, audited by the president and secretary of the board of health and approved by the governor, and then shall be paid as other accounts of said board.

This section appropriates two thousand dollars, part of which we may use in organizing these Boards. With this fact and the number of townships in view, we shall be able this year to pay to each Board such sum under ten dollars as is actually expended by them. The bill of expenditure must be certified by the assessor and the chairman of the township committee. It is believed that in each township the Board of Health thus constituted may meet at the time of the transaction of other business, and will need to expend but little, except where special cases recognized by the town committee, or complaints, may require attention. In such cases the public benefits far outweigh slight expense. The State Board of Health, as a body, has only its actual expenses paid, and these local Boards can do much on the same basis, with such special provision for any special service. The time has come when population must be cared for as a great material resource and as a part of our prosperity. Small villages and country districts often have their local nuisances or cases of spreading contagions, and there is need of some authority to which to appeal. It is as unprofitable as it is afflictive to have localities suffer from diseases or nuisances which are within the range and duty of local control. The Board hopes that careful attention will be given to concise yearly records in the Town Health Book, and will expect every three or five years by an examination of all these records, as well as from the annual reports transmitted, to secure valuable facts as to the care of health, the prevention of diseases and pauperism, and the promotion of public welfare.

Sections seven and eight are as follows:

7. And be it enacted, That the board of health of any city, borough, incorporated town or township, shall examine into all nuisances, foul or noxious odors, gases or vapors, or causes of ill health or disease that may be known to them or certified to them by three or more freeholders or tenants, as in their opinion

injurious to the health of the inhabitants within their township, or in any such vessel within any harbor or port of such city, borough, town or township, and shall deal with the same as in the manner herewith directed, to wit: whenever such nuisance or source of noxious odors, or cause of ill health or disease, shall be found on public property, or on the highway, the person or persons officially in charge thereof as overseers, civil officers, directors or trustees, shall be notified to cause the same to be removed as the case may require; and if failing so to do the procedure shall be the same as hereinafter provided in the case of private individuals.

8. And be it enacted, That whenever such nuisance, source of foulness or cause of sickness hazardous to the public health, shall be found on private property, that the board of health of the city, town or township in whose limits it may be, shall at once notify the owner at his own expense to remove the same within such time as said board shall deem the public health to require, a duplicate copy of the notification being also left with one or more of the tenants or occupants; if the owner resides out of the state and cannot be reached with notice speedily enough for the necessities of the public health, a notice left at the house with the tenant shall suffice; if the owner thus notified shall not comply with such notification or order of the local board of health within the time therein specified, said board shall proceed to remove said nuisance, source of foulness, or cause of sickness hazardous to the public health, and all expenses incurred thereby, shall be a lien upon the property of the owner of the real estate or building on which the nuisance has occurred, for which he may have action against any person or persons who have caused or allowed said nuisance; and it is also provided, that the property owner shall have the right under his notification, of speedy reference to the state or county board of health, acting in a body or through its executive officer, within such time as the local board of health shall on his application direct, unless in its judgment the danger to the public health is too immediate to admit of delay; and in case any injunction or stay of proceedings in any form is applied for, such injunction or stay of proceedings shall not be issued until the local board and the state board have been notified to appear and be present at such hearing; but the failure of the owner to cause removal,

or the refusal of the court applied to to grant a stay of proceedings, shall not prevent the party or parties making the application from any suit at law and recovery of damages, if the alleged nuisance be shown to have been in no way hazardous or prejudicial to the public health.

These sections are in accord with the highest legal advice as to methods, and can be carried out when the public safety demands. Some one member of the Township Board of Health may be recognized as its chief executive officer, to act for the Board by their authority. Those seeking the removal of nuisances will often aid in preventing unnecessary expense.

Section ten is as follows:

10. And be it enacted, That at the enrollment of the children each year by the clerk of district schools or by other proper officers in cities, inquiry shall be made as to how many of the children within the school age are unvaccinated, and the same shall be designated by a mark on said roll, and in the case of any found unvaccinated whose parents desire them to be protected from small-pox, but who, in the judgment of the board of education or the trustees of the school district, are not able to pay therefor, the school clerk or other authorized person may give to said child or children a permit to appear at the office of any regularly licensed physician of said school district, or of said township, to be vaccinated, and any such physician, on the presentation of such permit, with his certificate appended thereto that the said vaccination has been by him successfully performed, shall be entitled to receive from the township committee fifty cents for every such certified case.

This section extends to the poor the privilege of vaccination, and thus relieves them from an exposure which might not be culpable on their part. Incorporated cities are only exempted from these provisions if they have municipal charters which have similar and generally far more mandatory powers. These will also make yearly reports to the State Board of Health. Thus, being in possession of vital statistics, and of brief health reports from every part of the State, we shall be able to make such a summary as will exhibit the actual health condition of our population. Thus we may know how to deal with, and abate evils whether general or special, and to compare each part with the other. The general health condition of each township and city needs this supervision.

Besides these general health provisions, Hudson county and some of our cities have secured larger powers for abating localized evils. Authority to deal with epidemics as found among animals has been given to this Board. A law has also been passed, which, while not intended to endorse the medical diplomas of the many poor medical schools, will help to restrict the malpractice of those who are dealing with serious diseases, without the least evidence of any acquired skill and competency.

This Board now, more fully than ever before, invites the co-operation of every municipal and township Health Board. Believing in the local execution of sanitary laws by local authorities, it only insists upon such uniformity as is necessary for co-operative State interest, and such as has received the sanction of the best medico-legal sanitarians. The highest results of social life and health care can only be secured by a central bureau to collect, collate and advise, and by such strict and co-ordinate administration in each city and district as both general and local interests demand. The organization is now imperative, but ordinances and their execution depend on localities. We ask the mayors and city clerks of cities, and the assessor or township physician of each township, to at once call together the persons designated in this act, and communicate the names to us.

Each Health Board should carefully preserve the yearly reports of the New Jersey State Board of Health, which will be sent to the assessors and city clerks for this purpose. The three already published can be had of the assessors. The Third Report is especially needed, as containing the circulars thus far issued, and former laws that have been passed. So soon as three or four are obtained they should be bound, so as not to be mislaid.

All inquiries or communications should be addressed, State Board of Health, Trenton, N. J.

By order of the Board.

EZRA M. HUNT,

Sec. of State Board of Health and Med. Sup't of State Vital Statistics.

Note.—This circular was placed in each Township Book furnished. Any modifications in the law will be reported from time to time. It is requested that Boards of Health, in addition to securing accurate returns of vital statistics, shall in their annual reports, state the prevalence of any disease during the year—the number of cases as accurately as possible.

CIRCULAR TO LOCAL BOARDS OF HEALTH.

TRENTON, September 15th, 1880.

GENTLEMEN:—A report from your Board of Health to October 1st, will be expected to be sent to the office of the Board, State House, Trenton, if possible, by October 15th, and not later than November 1st.

Important facts and statements will be embodied in the State report, and the whole will be kept on file for future reference as to the conditions of public health in all localities of the State.

We have already become aware of important work done by many of these boards. Others, because of locality or tardiness in organization, or because members have failed in comprehending the work to be done, have merely organized.

The few that have failed to organize must immediately do so, and report to us the names and address of the members.

The period since the law went into operation is so brief, that this year we only seek correspondingly brief reports on such of the topics referred to on the printed page of the book that was sent, as may have come under the consideration of the Board. In cities and the more populous districts, it is well to follow the order of the book schedule, A, B, C, etc., in the order there presented.

The report of the State Board, for this year, will contain suggestions as to the work of local boards.

All inquiries should be addressed State Board of Health, Trenton, N. J.

ANNUAL REPORT

Of the Local Board of Health of (city or township)................. county of....................................for the year ending October 1st, 188

NAMES AND POST OFFICE ADDRESS OF MEMBERS.

....

....

SCHEDULE OF SUBJECTS FOR REPORT.

A. Location, population and climate.
B. Geology, topography and contour.
C. Water-supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Houses and their tenancy.
G. Modes of lighting.
H. Refuse and excreta, (how managed.)
I. Markets.
J. Diseases of animals.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Schools and school and other public buildings.
N. Alms-house hospitals, and other charities.
O. Police and prisons.
P. Fire guards.
Q. Cemeteries and burial.
R. Public health laws and regulations.
S. Registration and vital statistics.
T. Quarantine or care over *contagious* diseases and vaccination.
U. Sanitary expenses.
V. Heat and ventilation for dwellings.

Other subjects may be named under W, X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters which designate the topic treated.

Under W, give all facts as to diseases which have occurred the past year.

A.

B.

"AN ACT TO REGULATE THE PRACTICE OF MEDICINE AND SURGERY."

TRENTON, June 1, 1880.

Copy of a law passed by the Legislature of 1880, entitled "An act to regulate the practice of Medicine and Surgery."

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That every person practicing medicine or surgery in this state in any of their branches for gain, or who shall receive or accept for his or her services any fee or reward either directly or indirectly, shall be a graduate of some legally chartered medical college or university in good standing, or some medical society having power by law to grant diplomas; and such person before entering upon said practice shall deposit a copy of his or her diploma with the clerk of the county in which he or she may sojourn or reside, and shall pay said clerk ten cents for filing the same in his office; said copy to be a matter of record, and open to public inspection.

2. And be it enacted, That any person who shall practice med-

icine or surgery, without conforming to the requirements of the first section of this act, shall be deemed guilty of a misdemeanor, and on conviction, shall be punished by a fine of twenty-five dollars for each prescription made or operation performed, said fine to be sued for and recovered in an action of debt, by any person who will sue for the same, and in default of payment of said fine, the offender shall be imprisoned in the county jail for a period of not less then three, nor more than six months; *provided always*, that he or she may be liberated at any time by paying the amount of said fine and costs.

3. And be it enacted, That it shall be unlawful for any person not qualified according to the first section of this act, to collect any fees for medical or surgical services.

4. And be it enacted, That any person who shall offer for record a copy of any diploma which shall have been issued to any other person, or a diploma issued or obtained fraudulently, shall be deemed guilty of a high misdemeanor, and on conviction thereof, shall be punished by a fine of not less than three hundred dollars, nor more than five hundred dollars, or imprisonment at hard labor for not less than one nor more than three years, or both at the discretion of the court.

5. And be it enacted, That nothing in this act shall be so construed as to prevent any physician or surgeon in good standing, and legally qualified to practice medicine or surgery in the state in which he or she resides, from practicing in this state, but all persons opening any office, or appointing any place where he or she may meet patients, or receive calls, shall be deemed a sojourner in this state, and shall conform to the first section of this act.

6. And be it enacted, That this act shall take effect on the first day of June, one thousand eight hundred and eighty.

This law did not emanate from the State Board of Health, but its bearing on the public health is such that we send a copy to local boards and to physicians. It has been sought by the people and by practitioners of the different schools who concur in the view that no one should be allowed to announce himself or herself as a doctor of medicine, who can not show some evidence of such kind of instruction as is indispensable in the attempt to treat human diseases. While this does not assert the competency

of all having diplomas, since some of our medical colleges are not strict enough, it makes a good approach to protection and gives the best legal assurance now available. Under such a provision three thousand unauthorized practitioners in the State of Illinois have ceased to impose upon the public.

Every local board of health and every general or local medical society in the State should now see to it, that in such township and city the diploma or medical license of any person who claims to be a doctor in medicine and surgery is put on record. [The diploma is not required to be translated.] Unless local authorities attend to this the law might be neglected. If they do, it will soon appear who are authorized practitioners in this State. It will also assist to ascertain from whence come the purchased diplomas which are sometimes found in the hands of authorized practitioners.

Those who already have their diplomas or medical license on record in the county in which they reside, need only to look it up and re-enter it, as on file.

If any person claims to have lost his diploma or certificate of license, the law makes no provision therefor, but if such person will send a statement of the fact, and of the institution and date of graduation to the county clerk, it will, we believe, serve as protection from penalty for breach of the law, until the letter can be fulfilled, or provision made for such special cases. County clerks need to see the original diploma, and compare it with, the copy offered, and enter that fact on the back of the copy or else take the affidavit of the person offering it.

CONTAGIOUS DISEASES OF ANIMALS.

A supplement to an act entitled "An act to establish a state board of health," approved March ninth, one thousand eight hundred and seventy-seven.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That in addition to the powers conferred by the act to which this is a supplement, said board shall have full power and authority to examine and determine whether pleuro-pneumonia, rinderpest, or any other contagious or infectious disease exist among animals in any county in this state; and that

the sum of five hundred dollars is hereby appropriated to defray the actual necessary expenses of said board while making such examinations.

2. And be it enacted, That in the event of any contagious or infectious disease as aforesaid, breaking out or being suspected to exist in any locality in this state, it shall be the duty of all persons owning or having any interest whatever in said cattle, immediately to notify the said board of health, or any one of them, of the existence of such disease, and thereupon it shall be the duty of said board of health, or any member thereof, to immediately proceed to the place or places where said disease is reported to exist, and to quarantine said animal or animals, and take such precautionary measures as shall be deemed necessary; to prescribe such remedies as in their judgment will be conducive to the recovery of such animal or animals, and to enforce such regulations as may be adopted by said board of health.

3. And be it enacted, That the board of health aforesaid, and all such assistants as they may appoint, whenever in their judgment or discretion it shall appear in any case that the disease is not likely to yield to any remedial treatment, or whenever it shall seem that the cost or worth of any such remedial treatment shall be greater than the value of any animal or animals so afflicted, or whenever in any case such disease shall threaten its spread to other animals, to cause the same to be immediately slaughtered, and their remains to be buried not less than four feet under ground, and all places in which said animals shall have been kept to be cleansed and disinfected.

4. And be it enacted, That in all cases where animals afflicted with, or which shall have been exposed, shall have been slaughtered or killed by the order of the said board of health, or their assistants, it shall be the duty of said board to appoint three competent and disinterested freeholders to appraise the value of the animals so killed or slaughtered, at the time they were so killed; who shall be affirmed, or sworn before proceeding to act, to make a just and true valuation of said animals so killed, at the time of their slaughter, two-thirds of which valuation or appraisement shall be paid to the owner or owners by the state.

5. And be it enacted, That any person or persons refusing or neglecting to notify said board of health, or any of them, of the existence of pleuro-pneumonia, rinderpest, or any other contag-

ious or infectious disease among cattle, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than two hundred dollars, or by imprisonment not exceeding one year, or both, at the discretion of the court.

6. And be it enacted, That all bills for money expended under this act shall be audited by the comptroller of this state and then submitted to the governor for his approval and after being thus audited and approved by the governor, shall be paid by the state treasurer upon warrant of the comptroller.

7. And be it enacted, That said board shall keep a full record of their proceedings and shall publish the same in the annual report of the state board of agriculture, yearly, and every year during the existence of this law.

8. And be it enacted, That if any person or persons shall knowingly either buy or sell or cause to be bought or sold any animal or animals affected with pleuro-pneumonia, rinderpest or any other contagious or infectious disease, all such person or persons shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not exceeding two hundred dollars or imprisonment not exceeding one year, or both, at the discretion of the court.

9. And be it enacted, That in case an emergency shall arise and a larger sum shall be deemed necessary, than the amount appropriated by the preceding sections of this act, said state board of health shall present the facts in evidence to the president of the state agricultural society, and the president and executive committee of the state board of agriculture, who shall authorize such additional expenditure as in their judgment they may deem the exigency of the occasion to demand; provided that in no case shall the amount of money thus authorized to be expended exceed the sum of five thousand dollars in any one year.

10. And be it enacted, That all acts and parts of acts inconsistent with this act be and the same are hereby repealed, and that this act take effect immediately.

Approved March 12, 1880.

TO FARMERS AND DEALERS IN STOCK.

CIRCULAR A.

The act of 1877, constituting a State Board of Health, made it the duty of this Board "to make inquiries and reports in reference to diseases affecting animals and the methods of prevention." An act of the present Legislature gives additional power in reference to pleuro-pneumonia or other contagious diseases affecting animals. The State Board of Health directs this circular to be distributed.

The legislation of this State as to the diseases of animals, only has reference to preventing the spread of infectious or contagious diseases. When animals are seriously sick from any cause, the owner should make his own arrangements for *skillful treatment.* But when any infectious or contagious disease so far prevails as to threaten to become epidemic, the results which may accrue to citizens at large are so serious, that all governments recognize the right to investigate for the prevention or limitation, and to enact such restrictions as those skilled in the management of epidemics may advise. This State has now placed this oversight within the jurisdiction of the State Board of Health, and thus imitates the custom of other countries.

PLEURO-PNEUMONIA.

The chief infectious malady which has been considered as existing in this State is *Pleuro-Pneumonia.* It may be called lung-plague, but not cattle-plague, since the latter is the name for the very different disease, Rinderpest. That the disease is one which inclines to spread, is agreed by all authorities. Its very threatening justifies the expenditure of such an amount of money as may be necessary to determine its character and its extent. When discovered much depends on the severity of the type or the disposition it has shown to become epidemic.

It is not generally claimed that it ever occurs any more than small-pox, except as it is transported from some previous case. This Board will at first seek to determine where infectious pleuro-pneumonia now exists. With a rigid regard to the trouble of quarantine, it will only exercise the power when the rights of

the people require it. Such action, however annoying to the owner, is in his real interest. We propose not to give orders rashly; to enforce them when given.

Our trade, food supply and stock interests will be greatly aided when, as we trust will soon be the case, we can free each owner from any suspicion of the disease among his cattle.

General Le Duc, the Commissioner of Agriculture, responds at once to our request for an active co-operation with us in stamping out this disease where it exists, and in settling, by expert aid, the question of its extent. In this, too, we are to have the counsel and support of the Executive Committee of the Board of Agriculture. A rapid sanitary inspection will at once be instituted at all places where it has recently prevailed. It is the duty of any owner having cause to suspect such a disease to send us notice.

The attack usually begins with coldness, and dry, hacking cough, with symptoms of pain and uneasiness. The animal refuses food. Milch cows diminish in milk. Even an unskilled man knocking with the fingers against the opposite sides, back of the shoulders, will detect the difference in sound of the two sides.

Both the fever and heat are marked. Many of the symptoms correspond with pleurisy or pneumonia in man—with the same varied severity, and with either acute or chronic symptoms. If new cattle have come into the herd, or if the disease is prevalent near by, there is more ground for suspicion.

The owner must exercise close watch and honestly seek to know whether there is ground to suspect infection. In disputed cases the only way is to consent to submit it to skilled examination and inquiry, and not to make a positive diagnosis in matters in which the owner cannot expect himself to be fully competent.

On March 15th the Secretary of this Board made a visit to a farm on the Delaware, opposite the New Jersey border, in order to examine into the symptoms of the disease, and to compare it with other lung diseases in man or animals. The account of the farmer was that three months previous he bought a cow which, a few days after, sickened and died. He has since lost twelve. His own account, and that of adjoining farmers, would, we think, satisfy most that the disease is infectious pleuro-pneumonia. The United States Veterinary Surgeon, the State Inspec-

tor of Pennsylvania, and other recognized authorities were present, by appointment. Physical examination of four animals showed each with one lung consolidated; three had been sick less than one week and one four weeks. Post-mortem examinations fully verified the diagnosis. The lungs were found increased from about two and a half to twenty pounds, with such changes as are now being microscopically examined. A cow had died of the same disease three days before at Camden. There can be no doubt that it exists more or less in this State, and still more in Pennsylvania and Maryland, from which its ingress must be guarded.

It is strongly in the interest of the farmers and stock dealers of this State in every way to meet the facts and aid us in a speedy riddance of the malady. We propose to act in concert with them for the public welfare. There can be but one conclusion after due examination had—where the disease is found to exist, we must either isolate or quarantine, or give notice to others of the place where it exists, or notify the owner that he will be held accountable if any animal of others becomes infected by exposure to his herd. Where the veterinarians find the disease it is better to kill the animal.

The fact of pleuro-pneumonia in an animal does not decide that it is unfit for food use. This is determined chiefly by the severity of the sickness.

All farms or herds in the State which have been adjudged to have had infectious pleuro-pneumonia should, as a preventive, keep the cattle this spring and summer in temporary sheds, so that the others can be thoroughly cleansed of all moveable material and be well whitewashed. It is best to add four ounces of dry chloride of lime to a gallon of the whitewash. In any case the cattle will be benefited by this removal from the yards, and the farmer's interest be promoted by the removal of all suspicion of the disease. . It is a short-sighted policy for any one for a little present saving to subject his cattle to continued suspicion, or to an actual and prolonged existence of the malady.

As it is believed that the chief contagion comes from the lungs it is best to sponge the mouth and nostrils of all well and exposed animals, twice each day, with a solution of chloride of zinc. The fifty per cent. solution (Squibb's) costs twenty-five cents per pound, and, diluted one-fourth, a tablespoonful of it

suffices each time. Or it can be purchased solid in ounce bottles for eight cents, and dissolved in a half gallon of hot water. A little tar rubbed in the mouth and nostrils also cleanses. Those about sick animals should wash their hands in the zinc solution. For various other disinfectants, see Third Report (or the last July circular) of the State Board of Health.

Every farmer who purchases new stock should, for a month, keep it apart from his herd while any infection is prevalent. No cattle should be allowed to pasture on commons, as this disease thus spreads in summer. Read the law and the penalties you may incur by spreading the contagion. It is to be remembered, that animals, in order to preserve health, need to be kept naturally; that they need right food, pure air, good water and exercise in order to be healthy. If well fed, and yet having neither rubbing nor exercise, the result must be to breed disease. It is profitable to change stabled cattle from their stalls from time to time. Some diseases are made malignant or contagious by closeness and filth. It is for the interest of all owners to adopt those precautions which, by the most successful dealers, are regarded advantageous. Milk is a great absorbent of contagion. It is very important that it should not be kept standing in or near the yards, but the cans to receive it should be outside the pens and yards, and removed as soon as the milking is over.

As the present law extends to the care of all infectious diseases of animals, and has not single reference to any one disease or any single year, we shall hope to aid and to be aided by all those who rightly estimate the great pecuniary profit and personal comfort of prevalent good health among the lower animals. Cows kept after the packed-herring system, or tied all winter in a stall, will not maintain good health, and will stand ready for any epizootic disease.

PNEUMO-ENTERITIS.—(HOG CHOLERA.)

There is evidence that this disease prevails considerably in some parts of the State. The loss to this country last year was about twenty millions of dollars from this disease.

It is actively contagious. The name cholera deceives as to it, for it is a fever in which not only the intestines, but the lungs and glandular system are usually affected.

It commences with loss of appetite and constipation; the skin becomes reddened and often pimpled. Cough and hurried respiration, as well as diarrhœa, are among the symptoms. About seventy per cent. of the pigs die in two weeks, while those surviving are of little value. The time of catching is generally from five to fifteen days. The only method of dealing with it is the same as with pleuro-pneumonia, viz: the killing of all sure cases, isolation of the sick, and an entire removal to another pen of all well ones.

The Board will be glad to receive information as to any prevalent disease of animals, and will give to the subject such attention as it may demand.

Whenever any contagious or infectious disease has caused the death of any animal, or is believed to exist in any neighborhood, any person may properly state the fact to us.

Copies of the law can be had on application.

Letters or postals should be addressed,

State Board of Health, Trenton, N. J.

TO TOWNSHIP AND CITY BOARDS OF HEALTH IN REFERENCE TO INFECTIOUS DISEASES OF ANIMALS.

CIRCULAR B.

TRENTON, April 10th, 1880.

Both public health and financial interest require local attention to contagious diseases among animals.

Infectious pleuro-pneumonia and other diseases of cattle greatly concern milk and food supply.

Pneumo-enteritis, or hog cholera, and other diseases of swine affect human health.

Glanders, a disease of horses, is directly communicable and very fatal to individuals.

Just now there is need to guard our State against infectious pleuro-pneumonia and to rid us of suspicion of its prevalence, which is far beyond the actual facts. It is a disease which, where it exists, should not be concealed and should be isolated, and no

communication with suspected herds should be allowed until all risk is at an end.

It is to the interest of every city and township now to see to it that the disease is prevented in their respective districts. City stables are oftener centres of contagion than are the herds of farmers.

The formation, under a recent law, of boards of health in each township and city of the State, and the new powers of the County Board of Health in Hudson county, enable us to have local oversight of these and other diseases throughout the entire State.

Both city and township boards of health are enjoined carefully to guard against all contagious diseases.

Let all local boards of health inquire also into such diseases of animals as seem to be contagious and notify the Board of the same. We have full power to examine and determine whether any contagious or infectious diseases exist among animals in this State. It is a work incidental to your oversight of the general health.

The late act as to diseases of animals does not restrict this power of local boards or that of township committees under former laws.

The township board of health should enjoin the assessor in his visit to find out the existence of any such disease. In cities local inspectors may do the same. No city is alive to its own interests as to milk and food supply and as to health conditions that does not learn where and how animals are kept within its limits.

When any local animal disease is reported to us, and authenticated as possibly infectious, we shall at once make inquiry, and, if really necessary, at the expense of the State, send an inspector. If the disease is found we shall certify the same to the owner or person having interest therein. We shall not quarantine but by his consent, but if not, shall give notice to him and others that the disease exists in his herd, and warn him that the law requires that he should notify the Board, and also of the penalties of purchase or sale as contained in sections five and eight of the act of March 12, 1880. If by delay in separating or killing infected animals, or by exposing others to the

contagion, other animals are affected, the owners thereof, as well as this Board, will have action in law against him.

In case of the slaughter of animals under our direction, they will be paid for at two-thirds their full actual value.

There is now so little of the disease in the State that it is all the more practicable to secure its complete eradication.

We have had the 110 herds which were in quarantine at date of March 10th, under the former authority, examined, and find not over two that are now centres of contagion and one other that has shown the disease since March 10th. We shall secure the complete isolation of these animals and the herds to which they belong. We shall seek the modification of New York restriction as not now needed toward our whole State.

While by consultation with the authorities of Pennsylvania, and with farmers and stock-raisers in our own State, we are satisfied that methods of ferry inspection are not feasible or successful, we have arranged a system of notification and oversight which will be no less efficient than the former plan in preventing the ingress of the disease from other States. A milk inspector, employed by the State, will aid in inquiry as to the contagious diseases of animals. While local boards must feel charged with the duty of looking after their own districts, we shall thus be able in various ways to aid local efforts, as well as to seek information through individual sources and by our own special methods.

All communications should be addressed

State Board of Health, Trenton, N. J.

CONTAGIOUS DISEASES OF ANIMALS.

CIRCULAR C.

TRENTON, August, 1880.

The State Board of Health has had oversight of the contagious diseases of animals since March 12th, 1880. Although cases of glanders and of pneumo-enteritis (hog cholera) have occurred, our chief attention has been called to the contagious diseases of neat cattle. Most of the herds in quarantine previous to March 12th, were so far recovered as not to need longer detention. We

have not been able to trace subsequent cases that have occurred in the State to these herds. Outbreaks which have occurred in some of the counties are now, we believe, under control.

In a township in Union county, where pleuro-pneumonia has long been troublesome, the township Board of Health has efficiently aided us. The most recent and troublesome cases are in Burlington county, where it has recently appeared in five herds, in which several cattle have been slaughtered. It is also under supervision in two other counties. We believe it is to be decided within the next year whether the pest shall be localized in our State. If any one doubts its devastating nature, its communicability or the calamity of its presence, we only ask that they will send to us for the names of farmers in our State who have recently suffered from it, and confer with them. The slaughter of all fresh cases and the separation of the exposed herds from all others is imperative. In every case we have had thus far, the disease is, we think, traceable to purchased cattle. Cows sold from infected herds or store calves, which have been taken from infected cows, often convey the disease.

No farmer or stock raiser should now make additions to his herd, unless he can trace the animal purchased and receive a warranty that there has been no exposure. Where cattle are bought it is well to keep them at least six weeks from mingling with the general herd.

Where the disease has manifested itself, we recommend the erection of temporary sheds until November and a thorough disinfection of all stables and sheds. Chloride of zinc is advised to be used for the sponging of the nostrils *both of the sick and well cattle*, where the disease has appeared.

An ounce bottle of the solid chloride, costing ten cents, can be dissolved in a half gallon of hot water, and from a half gill to a gill in all be given in the drinking water at different times each day. Common tar smeared in the nostrils is of service.

It is best to heap all manure outside of the buildings and to sprinkle hay or straw, which has been used, with some disinfecting solution, and remove it and whitewash the buildings.

Sulphate of iron (green vitriol or copperas) costs two cents per pound, and a pound to a gallon of water answers well for sprinkling over surfaces that have been exposed.

"Calx powder," made by powdering one bushel of dry char-

coal and two of stone lime and mixing them, is also a good corrective.

Sirel's compound consists of—

Sulphate of iron (green vitriol or copperas), 40 lbs.

Sulphate of lime (gypsum or plaster of Paris), 50 lbs.

Sulphate of zinc (white vitriol), 7 lbs.

Bone charcoal (ivory black), 2 lbs. (Or 6 lbs. of dry wood charcoal.)

This may be sprinkled dry over places exposed to moisture.

What is known as the "lime and salt mixture" is not only valuable agriculturally, as an addition to compost, but has valuable disinfecting and deodorent properties. It is prepared by adding one bushel of salt to three bushels of fresh slaked lime. Stir it frequently until the mixture becomes moist, and then add to it twice the amount of loose dry earth. This may be scattered freely over the ground where the cattle have been kept or have pastured.

During heavy winds or storms, all doors and windows of sheds should be fully opened, so that stalls and all parts may be flushed with air. There is much need of attention to the airing of stalls when the cattle are out of them.

There is reason to believe that many farms where pleuro-pneumonia has once occurred have had new outbreaks months after, in removing straw or hay, or by, in some way, stirring up infective particles which had been concealed. There is great encouragement to seek its prevention, since the disease is believed never to occur in this country, except as it is caught from some previous case or from exposure to the immediate grounds or buildings where the disease has before existed.

Farmers and dealers need to be watchful, and whenever any of their cattle seem ailing they should at once be separated from the rest. If they have good reasons to suspect it to be pleuro-pneumonia, or if the local veterinarian so pronounces it, there must be no delay in notification as required by the law.

Local boards of health and township committees may often be consulted with advantage. Where the disease prevails they are especially charged with the duty of preventing its spread.

They are the appointed guardians of the welfare of their respective towns and townships, and for mutual protection should aid in preventing the spread of so serious a disease.

Cattle must not run at large in townships in which it prevails. The milk from ailing cows should not be sold, although there is no record of the disease from this source. Yet common judgment teaches us that animals that are feverish and sick cannot furnish good milk. Cattle that recover from pleuro-pneumonia are generally left with one lung diseased, and they should be fatted. The disease thus far overcome does not effect the meat. As some believe that an animal once having had the disease may retain an infecting power or have an outbreak from the diseased lung, it is better to fatten any animal that has been known to have had pleuro-pneumonia and to have partially recovered.

If only for a year or two all will be diligent in preventing the outbreak and conveyance of this great pest, we shall get rid of it in this State.

Any inquiry may be directed

State Board of Health, Trenton, N. J.

AN ACT TO REGULATE THE SALE OF MILK.

A supplement to "An act to regulate the sale of milk," approved April fifth, one thousand eight hundred and seventy-eight.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That the third section of the act to which this is a supplement, which section reads as follows:

"3. And be it enacted, That all penalties imposed under the provisions of this act, may be sued for in any county of this state where the offence is committed, in any court having competent jurisdiction, one half of the fine to go to the person making the complaint, and the other half to be paid to the county collector for the benefit of the county," be amended to read as follows:

3. And be it enacted, That all penalties imposed by the provisions of this act, may be sued for in any county of this state where the offence is committed, in any court having competent jurisdiction; that the state board of health are hereby empowered and directed to appoint each year a competent person who shall act as inspector of milk, at a salary not exceeding six hundred dollars per annum, payable on the order of the president and

secretary of the state board of health, approved by the governor, in quarterly payments for the purposes of this act, and who shall act until removed by said board or until his successor is appointed; said inspector, having reason to believe the provisions of this act are being violated, shall have power to open any can, vessel or package containing milk and not stamped or marked as directed by the first section of the act to which this is a supplement, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can, vessel or package to contain any milk which has been adulterated or from which the cream or any part thereof has been removed, said inspector is empowered to pour the contents of such can, vessel or package upon the ground, and bring suit against the person or party so violating the law, and the penalty when so collected by such suit shall be paid into the treasury of this state; that when suit is brought under this act by any person other than such inspector, the penalty, when collected, shall one half go to the complainant and the other half to the county collector for the benefit of the county.

2. And be it enacted, That this act shall take effect immediately.

Approved March 12, 1880.

NOTE.—A more stringent act has just passed.

AS TO MILK SUPPLY.

CIRCULAR A.

TRENTON, April 26, 1880.

The evils arising from the adulteration of milk are so serious that many of the larger cities, and many of the states, have found it necessary to enact laws or ordinances in reference thereto.

Not only is there an unfair and injurious competition when adulterated or inferior milk is sold, but great injury is done to the public health. Children are often compelled to rely upon purchased milk, and there is abundant evidence that much sickness and many deaths result from the impurity or bad quality of this food.

The unfairness of such traffic and the evil to consumers is such that the Legislature of this State, at its last session, directed the

State Board of Health to appoint a Milk Inspector. Applicants were subjected to a careful chemical examination as to their knowledge and general fitness for such an appointment. William K. Newton, M. D., was selected to fill the position. He will, with the aid and direction of this Board, seek to correct unfair dealing and to detect attempted frauds.

Milk may be defined as pure when it comes from a healthy cow, and when nothing is taken from or added to it.

The adulterations most common are as follows:

The dilution of milk by water.

The sale of skimmed milk as natural milk.

The separation of the strippings from the rest of the milk.

The removal of small quantities of cream, technically known as "topping."

The sale of milk from cows too soon after calving.

The sale of milk purposely impoverished by modes of feeding or keeping.

The addition of soda or other alkalies.

The use of materials to thicken or whiten the milk.

The addition of coloring or other matters to cover up some fraud.

The following is a synopsis of New Jersey State laws, bearing on the subject of our milk supply:

Act of April 7th, 1875. The sale or keeping of adulterated milk is a misdemeanor, punishable by a fine of $50, and imprisonment for thirty days. To adulterate milk, or to keep cows for the production of marketable milk in an unhealthy condition, or to sell milk as pure milk from which the cream has been taken is also punishable as above. The addition of *water or any substance* is defined as an adulteration. Milk from cows fed on distillery waste (commonly called "swill") is declared impure, and contrary to this act.

Act of March 23d, 1865. To sell or bring to a cheese or butter factory adulterated or "skimmed" milk, or to keep back any "strippings," is punishable by a fine of $15.

Act of April 5th, 1878. Every person who shall sell, or who shall offer or expose for sale, any milk from which the cream, or any part thereof, has been removed, shall distinctly and durably stamp or mark, in letters not less than two inches in length, in a conspicuous place, above the centre, upon the outside of every

can, vessel, or package containing such milk, the words "skimmed milk," and such milk shall only be sold or shipped in or retailed out of a can or other vessel so marked.

Violations of this act are punishable by a fine of $50. The sale or exposure for sale of milk contrary to this act is presumptive evidence. The non-payment of the fine is punishable by imprisonment.

Act of March 12th, 1880,—supplementary to the above act. The State Milk Inspector is appointed and empowered to open any can, vessel or package containing milk, whether sealed or otherwise, or whether in transit or otherwise; and if upon inspection he shall find such can to contain milk which has been adulterated, or from which the cream, or any part thereof, has been removed, the inspector is empowered to pour the contents of the can upon the ground, and bring suit against the person violating the law. (See new law of 1881.)

Any citizen may act as complainant under these acts.

We ask the assistance and co-operation of all local boards of health, local inspectors, city and county physicians, and people interested in the supply of pure milk.

The State Inspector will visit in turn the various parts of the State, unknown to dealers, in order to check the sale of adulterated and impure milk. He will be provided with all the approved instruments for testing milk, and will, when necessary, make analyses to determine adulteration, etc.

It will be his aim to prevent dishonest dealing, so far as it affects the common interest of the milk trade and the health of our citizens. He is also to investigate evils to the milk supply that may arise from improper feeding, improper housing, or from existing diseases among milch cows.

Action at law will be had when required, or his services be available in evidence.

Communications may be addressed to William K. Newton, M. D., Paterson, or to the State Board of Health, Trenton, N. J., which intends to fully sustain the efforts of the Inspector in preventing a fraud so detrimental to the public health.

CIRCULAR TO LOCAL BOARDS OF HEALTH

And to those whose duty it is to make returns of Marriages, Births and Deaths.

The Index for the statistical year just ended, indicates an increase in the returns of marriages and births for the State, and a decrease of over one thousand in the returns of deaths. We have reason to believe that all returns have been more faithfully made than in any previous year, and the diminution in death certificates has been owing to a decrease of the rate of mortality.

By a comparison of our returns from different city clerks and assessors, we are more and more seeing how much of the perfection of the record depends upon careful attention and supervision of these officers. Carelessness or want of judgment on their part soon begets carelessness or neglect in those who by law are required to make the returns to them. Local boards of health are now so organized under the law that their influence can be brought to aid, where there is negligence, or they or the assessors can send direct notice to any who overlook their duty. It is enough here to say that accurate vital returns, by all States and countries are recognized as the "account of stock," without which a State or district cannot know its health condition, or provide therefor, any better than a merchant can reckon, without knowing the material on hand and the influences that are reducing its value or destroying it. Already in comparison of returns we are able to trace and compare localities of disease, which means abatement thereof, under the use of proper methods. Many of our cities are needing to study streets and blocks as related to disease. Townships may learn much by finding out through series of years what parts are most affected. Where ministers are dilatory as to marriage certificates, where physicians neglect to make returns of births, or where undertakers neglect to secure the burial certificates until after burial, and continue to neglect after being cautioned, it is the duty of the assessor and of the Local Board of Health to report the fact to the Bureau of Vital Statistics, which is under the Department of the Secretary of State. If any person hereafter fails to find the record of his or her marriage, or if the birth of a child, or if the death of a relative is not filed in this office, it may involve losses and embarrassment

for which the party neglecting is culpable under the law. Recently most important recourse has been had to these records, in testing the claims of life insurance, in legal proof of property rights, and in comparisons for the coming National Census; at the same time there is increasing evidence that physicians are appreciating these returns, as a part of their professional relation to their patients, and a duty the same as that which has so long been acquiesced in by those who have official charge at marriages, and by undertakers. The licensed medical profession is receiving recognition which is more than a pecuniary pittance, and more of the people are appreciating the great interests of public health thus promoted. We, therefore, ask as the part of all officers a vigilant and systematic attention to the reception and transmittal of the returns.

Blanks may always be had of the city clerks and assessors, or by application through postals directed to this office. A paper-bound book of blanks will be sent to such as require fifty returns of either kind each year. Physicians who may fail to receive the Annual Report will please notify us, and any clergyman may have it on application.

By order of the Bureau of Vital Statistics.

CIRCULAR AS TO SMALL-POX.

TRENTON, February, 1881.

The State Board of Health has evidence of the existence of *small-pox* in scattered localities in this State, as well in the cities of New York and Philadelphia. The epidemic, as existing in Camden long since, upon the invitation of the local authorities, received our attention, and vigorous measures were instituted by them. But now, from other sources, scattered cases have occurred in other towns and in rural districts, until it may easily become a wide-spread epidemic. Four or five cases, occurring in Trenton, have already disbanded the Normal School.

The right of school trustees to require vaccination in order to secure attendance at school in times of epidemic, or else to prohibit attendance is not questioned. By the terms of the health laws of March 11th, 1880, all school boards are authorized to vacci-

nate, at public expense, any pupils attending school who are unable to procure vaccination.

All local health boards need to see to it that vaccination is recommended, as well as rapid isolation of cases secured, if any occur. The cost of local epidemics of small-pox is very great, besides the risks to life and public health. The prevention of the disease is within the range and duty of your control. All our local health boards and school boards should co-operate in influence and provision for more general vaccination, and for re-vaccination of persons who have not been vaccinated since full growth. The heads of large manufacturing establishments need to attend to it, both in the interest of capital and labor. Trenton has set a good example in making the means therefore accessible.

Most of our physicians have full confidence in humanized vaccine virus, which is easily secured. *Vaccine virus directly from the animal* is preferred by those who have any fear of communication of other diseases through humanized lympth—a fear that is greatly magnified in the popular mind. It is, nevertheless, due that all have their preference, and that where vaccination is insisted upon as a condition of school attendance, bovine virus be used if desired. Many physicians prefer to use this. The New York City Board of Health, 301 Mott street, New York, furnishes it daily by mail. H. A. Martin & Son send it direct from their herd, Roxbury Station, Boston, Mass. Dr. E. L. Griffin, Fond du Lac, Wis., is prompt in remittal from his vaccine farm. Ready supplies can also be had from Philadelphia and other cities. The price per point is about twenty cents, and less in larger quantities. It can often be had from local druggists. There is reason to believe that much is sold for bovine virus which is not such, and that there is a failure in effect because of age and imperfect keeping.

We urge upon all physicians great exactness in selecting virus, and upon the people protection from the disease. Its outbreak every few years is not a proof of epidemic tendency. The periodicity rather occurs because that, after an epidemic, as soon as years enough have passed for a younger product of children to be out in public child-life, this susceptible material becomes so abundant as to insure extension if a single case is introduced from another section. Then there is an outbreak of

small-pox and of vaccination. Would it not be better if, somehow, the young population could be systematically protected? Let our various communities and the local boards now secure this, not only under present threatenings, but also as a wise preventive measure.

Copies of this circular will be sent more fully on application by postal to State Board of Health, Trenton, and any inquiries be promply answered.

IMPORTANT LAWS BEARING ON PUBLIC HEALTH,

PASSED BY THE LEGISLATURE WHICH ADJOURNED MARCH 25, 1881.

I. An act relating to Local Boards of Health.

1. Be it enacted by the Senate and General Assembly of the State of New Jersey, That all township or local boards of health in this state, organized under the provisions of an act passed March eleventh, one thousand eight hundred and eighty, entitled "An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto," may expend, for the purposes for which said boards are authorized, to the amount of fifty dollars as actual expenditure, not including any payment to members for attendance at the meetings of said boards, and the same shall be payable in the same manner as other bills presented to the collector, treasurer or other disbursing officer of the township, town or precinct; and in case any additional sum is, in the judgment of such board, needed to be expended in any township, town or precinct, the need thereof shall be presented to the township committee, common council or other governing board, and they shall have authority to appropriate such an amount, or pay such bills, as they may deem necessary for the purposes indicated in the act aforesaid.

2. And be it enacted, That any boards of health now organized in any of the cities of this state, under the provisions of their respective charters, as well as those which are only health committees, may, by the order and direction of the mayor and common council of said cities, organize their boards in accord with the provisions of the act aforesaid, and shall, in common with the boards of health of the several townships, towns or boroughs

of this state, have power to make and enforce such ordinances as the care of the public health demands.

Approved March 22, 1881.

II. An act entitled "An act to provide for drainage where the same is necessary to the public health."

This act gives well defined powers, and with judicious application can do very much to rid the State of malarial localities.

III. An act to prevent the adulteration of milk and to regulate the sale of milk.

Its terms are definite. The Milk Inspector must be a public analyst, to make "analyses, investigations of foods, drugs and other substances, as he may be directed so to do by the State Board of Health."

IV. Supplement to an act to regulate the practice of medicine and surgery. Approved March 22, 1881.

It adds the words "professional service," and increases the power of the law.

V. An act to authorize cities to construct sewers and drains and to provide for the payment of the cost thereof. Approved March 22, 1881.

VI. A supplement to " An act for incorporation of companies for draining and improving meadows and lands overflowed by tide-water.

VII. An act to prevent the adulteration of food or drugs.

VIII. A further supplement to an act entitled " An act to establish a State Board of Health," etc.

This act relates to the " Contagious Diseases of Animals," and gives to the State Board full power and control as to them, recognizing also the co-operation of local boards.

Other acts do not reach us in time for report.

SPECIMEN SCHEDULE OF SANITARY INQUIRY, (INSTITUTIONAL) BY THE NEW JERSEY STATE BOARD OF HEALTH.

Name and post-office address of institution.

Name and post-office address of physician.

Name and post-office address of chief officer.

Location.

Are buildings owned by township or county?

Area of ground and altitude above sea level.

Character of soil.

How are grounds improved?

General character of buildings and material of construction,

Date of erection and cost.

Average yearly cost of repairs.

Is there an accurate geological map and description?

Are there contour maps, topographical maps, and a plan and schedule of all underground apparatus or appliance?

Have natural water-courses been disturbed?

Is there any damming up of water for ponds?

Give place, size, depth, character and locality of any springs and wells.

Are they opened or closed, and what is the mode of getting water therefrom?

Is there any artificial drainage?

Size of rooms for bed or sitting rooms on first floor.

Size of rooms for bed or ward rooms on second floor.

Size of rooms for bed or ward rooms on third floor.

What is the finish of walls?

Are the rooms wainscotted?

How near to ceilings are windows?

Are there windows, shutters or blinds?

How is admission of sunlight regulated?

Is there shade?

Does sunlight enter all the rooms?

Have you had any accident?

Are all children vaccinated?

Have all adults been vaccinated within ten years?

What facilities have you, besides ordinary house cleaning, for cleansing and varnishing of furniture and bedsteads, mattresses, &c.?

Do you have wood or iron bedsteads?

Is there any system by which new suits of outside clothing are furnished to inmates and by which clothing long worn is cleansed by airing or heating?

What are the facilities for bathing and washing for inmates?

How is laundry work conducted?

Are the inmates fed in their rooms, or when able, do they come to a common table?

What is the arrangement for drainage?

What is the size, shape, thickness, construction and preparation of pipes? How joined?

Is there a basement or cellar? Is there an unoccupied attic?

How are these ventilated?

How much below ground level, and how occupied?

Does water ever stand in it?

Are walls and floors concrete?

Are sewers connected with drains?

How?

Give the exact fall per foot, and any variations.

How are sewers ventilated?

Are there grease traps?

What is the indoor water-closet arrangement?

Are water-closets in projections, or separated by corridors?

If there are any sewers or pipes leading from the house, give their size and construction and fall and outlet.

Give modes of ventilation, kinds of traps and just where located.

What is the out-door arrangement?

How often is the material removed, and by what method?

Do fecal and slop material mingle?

If separate, are urine and waste water separate?

How is slop-water disposed of?

What is the system of flushing or disinfection?

If to a cesspool, describe it and where it empties, and how it is cleansed and how often?

Is there open ventilation between the cesspool or sewer and the house?

If so give full plan.

What is the water supply?

Is it brought on all the floors, and how?

How is the water stored?

Is there an overflow pipe? If so how trapped and joined to what outlet?

If in cisterns, how often cleaned?

What their locality?

Is provision made for the "washings" of the roof to be carried off first?

Of what material is the roof?

If no cisterns, how is the roof water disposed of?

If water is got from wells, what are the chances for contamination with sewage or surface drainage?

Is there any reason to suspect impure water?

What is the system of ventilation?

Give full plan.

Have there been anemometer or other tests?

Is there any provision for changing the air of rooms during cold weather?

Have the heating and ventilating appliances been tested in varying conditions of atmosphere?

What is the method of heating?

Give plan.

How many wards or bedrooms have fire places?

What was the average number in the house last year?

What was the expense for maintenance last year?

What is the plan of outdoor relief?

What was the cost last year.

Have you a regular dietary each day?

If so, give the dietary each day.

Have you any insane paupers?

How many are demented or foolish?

How many are harmless?

Are they, or should they, be separately kept?

What are the arrangements for separation of males and females?

What are the nursing arrangements?

What is the medical attendance?

How is it arranged for?

How much is paid therefor?

How are medicines furnished?

Are any disinfectants kept on hand?

If so, how used?

Inform us what changes are needed in all present arrangements.

Physicians will state any facts of interest regarding sickness during past year, or sanitary defects existing.

What was the number of deaths, and their causes, last year?

Have you any system of employment for inmates?

What is the discipline and oversight of attendants?

Is any special industry followed?

If so, give particulars.

Is it profitable, or merely for occupation?

How many inmates have tobacco furnished them?

How many have opium furnished them?

What was the tobacco bill last year?

What was the liquor bill?

What was the quinine bill?

What are the arrangements for schooling children?

Are any apprenticed out, and at what age?

Are places sought for any not yet apprenticed?

What visitation have you that looks into the moral and physical welfare of the inmates? What provision therefor?

What provisions are there for amusements or for reading matter for inmates?

How many of the inmates were born in dependency?

What provision in case of fire?

What is the method of lighting?

Is any register kept of inmates as to habits, cause of dependence, mental condition, &c.?

What is the cubic space per inmate?

What are the hospital arrangements?

Is there any oversight of or inquiry into the physical condition of inmates?

SPECIALLY FOR JAILS.

Have any been detained as witnesses in cells during the past year, and how long?

What system have you for receiving excretions of the body during the night?

What in cases of sickness?

What are the chances for sunlight to enter cells and corridors?

Are prisoners allowed to smoke and make ablutions in the cells?

Cubic space of each cell.

What chance for change of air in cells?

If prisoners are suddenly taken ill in the night, how may they summon assistance?

Size of windows in cells.

Size of doors.

Amount of sickness and number of deaths yearly.

REPORT

OF THE

BUREAU OF VITAL STATISTICS.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

BY EZRA M. HUNT, M. D.,

Medical Superentendent of State Vital Statistics.

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THE CENSUS,

AS BEARING UPON QUESTIONS OF POPULATION.

The great design of vital statistics is to furnish an estimate of some of the most important conditions of population, and to aid in those objects for which an enumeration of inhabitants is instituted. Statistical inquiry has now come to be such a science and such a practical art of political economy, that the mere record of numbers is only one of the incidental purposes of statistics. Yet this must be accurately had in order to estimate the relative conditions and the ebb and flow of population.

The census of 1880 has been taken with more regard to extended studies of social, and race, and economical conditions than any that has preceded it. The large number of schedules furnished shows the range of inquiry. It still remains to be shown how the facts and figures obtained are to be most successfully applied to the study of the various branches of social study. Still more importance attaches to the census from the fact that the general government has also made provision to aid in the semi-decennial census, and thus prepared the way for a closer study of the people.

An effort was made to obtain returns in this regard from each State. While the plan showed the broad and just conceptions of the superintendent and his advisers, it also demonstrated that for vital returns its chief reliance must be upon statistics obtained near the time of the occurrence of the events. So the State bureaus will need to secure the most of this kind of information.

In the study of population in the States, an early question to be decided is, what shall constitute the sanitary unit of inquiry. Shall the vital conditions and the health of the people be compared by counties, or by townships, or by cities, towns, villages and rural districts. Shall there be comparisons with reference

to the geological basis, since, as in our State for instance, definite lines in this respect can be drawn? Or shall areas be taken with reference to special water-sheds, with comparisons of highland and lowland, mountains and of valleys with extended river relations. Or shall the comparison be made between dwellings upon the sea-shore districts, and those amid hill and mountain ranges. Or shall climate come into consideration, in a State so diversified as ours? These, and such like questions, naturally suggest themselves. Each in their turn, and when enough facts are gathered, will be worthy of thought and comparison.

But with present facts and present methods of obtaining a census, our first natural enumeration for comparison is by townships. In each township the area is sufficiently narrow to present the people as subjected to much of the same general kind of local influences. A variation, however, needs to be made in reference to the larger cities and towns. The smaller villages differ but little from the rural parts of the townships.

But so soon as population is aggregated in cities, it has its own consequent complications or changed conditions. So the larger cities need also to be compared among themselves. City Boards will need to compare parts of the same city with each other by wards or districts. Our State law provides that the vital facts as to cities of over 5,000 inhabitants shall be tabulated separately in order to facilitate comparisons. We, for the present, shall here give only two comparative tables, viz: one presenting the Census of 1880 n order to show actual present population and relative growth, and second, the same as to all cities now of over 5,000 inhabitants.

We also add as an item for information without distinct classification, the size of other towns and boroughs of this State so far as they can be separated from the township precincts with which they are enumerated, so as to aid in local comparisons, although there is great variety of incorporation, so much so that a commission not long since reported it impossible to enumerate the towns of the State. Yet the approximate statement is valuable for reference and to aid in future adjustments as to local boards of health. In a few cases comparisons of smaller localities cannot be accurately made without remembering that new townships have been formed on the area changed; where this is the case the fact must be borne in mind.

We give the census record in order to facilitate comparisons and for future study of the vital conditions and variations of the population. There may be some small corrections to be made in the last census, but these can be noted hereafter.

Entire population of the State	1870	907,144
" " "	1875	1,019,413
" " "	1880	1,130,892

The present total of 1,130,892 presents for the State a population 75,698 less than the total of New York City.

It is made up as follows:

Males	559,803
Females	571,089
Native	909,309
Foreign	221,583
White	1,091,856
Colored	38,796
Chinese	176
Japanese	2
Indians	58
East Indians	2
Albinos	2

These figures, as those following, are still subject to possible corrections from the census office.

LIST OF CITIES, TOWNS, VILLAGES, ETC., OF THE STATE, SO FAR AS THESE CAN BE GIVEN, WITH THEIR POPULATIONS.

NOTE.—Some towns have not been enumerated or reported in the census distinctly from the townships in which they are included. We give the list of every precinct, which differs in any wise from a township method of oversight, and the forms of its government so far as possible. There is great need in this State of some general law as to these organizations, and such uniformity as will admit of comparative study. As far as possible the mode of government will be indicated and the population, as distinct from the township, given so as to aid in future vital statistics. Where the town population is not given distinct from the township, the population will be marked *Twp.* The populations will be given as far as possible as by the census of 1880.

Atlantic County.

Absecon, town, in Egg Harbor township	507	
Atlantic City, city	5,477	
Egg Harbor City, city, in Galloway township	1,232	
Hammonton, town	1,776	Twp.

Bergen County.

Hackensack, in New Barbadoes, township	4,250	Twp.

Burlington County.

Beverly, city, in Beverly township	1,759	
Bordentown, city, in Bordentown township	5,334	Twp.
Burlington, city, in Burlington township	7,237	Twp.
Pemberton, borough, in Pemberton township	799	
Mount Holly	4,630	Twp.
Fieldsborough		

Camden County.

Camden, city	41,658	
Gloucester, city	5,347	
Haddonfield, borough, in Haddon township	1,480	
Merchantville, borough, in Stockton township	3,093	

Cape May County.

Cape May, city	1,699	
Cape May Point, borough, in Lower township	198	

Cumberland County.

Bridgeton, city	8,729	
Millville, city	7,660	
Vineland, in Landis township	6,005	Twp.

Essex County.

Belleville	3,004	Twp.
Bloomfield	5,748	Twp.
East Orange, city	8,349	Twp.
Irvington, village, Clinton township	2,742	Twp.
Montclair	5,146	Twp.
Newark, city	136,400	
Orange, city	13,206	

Orange, village	3,911 Twp.
n, town	2,742

GLOUCESTER COUNTY.

bury, city, in Deptford township	2,298

HUDSON COUNTY.

ne, city	9,372
burgh, town	1,206
son, city	5,510
en, city	30,999
City, city	120,728
, town	5,849

HUNTERDON COUNTY.

n, borough	842
htown, borough	1,039
ertville, city	4,183

MERCER COUNTY.

bersburg, borough	5,437
stown, borough, West Windsor township	1,396 Twp.
ton, borough	4,348 Twp.
n, city	29,910

MIDDLESEX COUNTY.

Brunswick, city	17,167
Amboy, city	4,808

MONMOUTH COUNTY.

y Park, borough, Neptune township	4,187 Twp.
old, town	4,302
Grove, Neptune township	4,187
ank, Shrewsbury township	5,059 Twp.
Branch, Ocean township	6,027 Twp.
rt, Raritan township	3,891 Twp.
an	2,699

MORRIS COUNTY.

n	2,685 Twp.
Randolph township	7,701 Twp.
town, town	6,838 Twp.

Ocean County.

Only Townships.

Passaic County.

Passaic, city	6,532
Paterson, city	50,887

Salem County.

Salem, city	5,057

Somerset County.

Somerville, town, Bridgewater township	7,997 Twp.

Sussex County.

Newton, town	2,513

Union County.

Elizabeth, city	28,229
Rahway, "	6,454
Plainfield, "	8,126

Warren County.

Belvidere, town	1,773
Hackettstown, town	2,502
Phillipsburg, city	7,180
Washington, borough	2,142

According to this we find that of the 1,130,892 of the inhabitants of New Jersey about 690,000 live in cities, or some form of incorporated towns. When our vital statistics reach over a greater number of years, there will be still more opportunity to study the effects of locality and of different density of population upon life and health—as also upon local prosperity.

From these we at present select out and associate cities and towns according to their population.

OVER ONE HUNDRED THOUSAND.

Newark, Essex county	136,400
Jersey City, Hudson county	120,728

Note.—Hoboken is so much a part of Jersey City that its close

proximity must be borne in mind in all vital study. The same is partly true of some of the suburbs of Newark.

BETWEEN SEVENTY-FIVE AND ONE HUNDRED THOUSAND.

No city.

BETWEEN FIFTY AND SEVENTY-FIVE THOUSAND.

Paterson, Passaic county	50,887

BETWEEN TWENTY-FIVE AND FIFTY THOUSAND.

Camden, Camden county	41,658
Hoboken, Hudson county	30,999
Trenton, Mercer county	29,910
Elizabeth, city, Union county	28,229

In reference to Trenton, it is also to be remembered that Chambersburg joins it closely with 5,437 inhabitants.

FROM FIFTEEN TO TWENTY-FIVE THOUSAND.

New Brunswick, Middlesex county	17,167

FROM TEN TO FIFTEEN THOUSAND.

Orange, Essex county	13,206

FROM FIVE TO TEN THOUSAND.

Bayonne	9,372	
Bridgeton	8,729	
Plainfield	8,126	
(North Plainfield, 3,217 additional.)		
Dover	7,701	Twp.
Millville, Cumberland county	7,660	
Phillipsburg	7,180	
Burlington, township	7,237	Twp.
Montclair, township	5,146	
Union, Hudson county	5,849	
Harrison, Hudson county	5,510	
Atlantic City, Atlantic county	5,477	
Chambersburg, Mercer county	5,437	
Gloucester City, Camden county	5,347	
Bordentown, Burlington county	5,334	Twp.
Salem, Salem county	5,057	
Morristown, Morris county	6,838	Twp.

Passaic City, Passaic county	6,532
Rahway	6,454

We have placed in this list those cities of over 5,000 in which, although the township population is included, it is so inconsiderable as not to affect the general estimate.

We now name others in which the city population, as distinct from that of the township, is unknown, but in which the township forms a considerable per cent.

Somerville, Somerset county	7,997
Bloomfield, Essex county	5,748
Red Bank, Monmouth county	5,059

CITIES, TOWNS, ETC., BETWEEN TWO AND FIVE THOUSAND.

Mt. Holly, Burlington county	4,630 Twp.
Princeton	4,348 Twp.
Lambertville	4,183
Asbury Park	4,187 Twp.
Boonton, Morris county	2,685 Twp.
Newton, Sussex county	2,513
Hackettstown, Warren county	2,502
Washington, Warren county	2,142

The death rates of these thus admit of comparison, although a period of about five years of observation is necessary, unless the indications of local disease are very apparent. These facts are thus put on record in order to aid the Central Bureau and all Local Boards in their study and tabulation of Vital Statistics.

The census of 1880 will be found for each township in the death rate tables, and need not be repeated here.

YEARLY OUTLINE AND SUMMARY.

In dealing with vital statistics, we need at the start to have clear views as to the intent of the record. One part is purely for legal use; another only for vital study. A third part has a mixed value. The relative proportion to be determined by the bearing of the information given.

Thus the name of a deceased person is secured for legal identification; the *cause of death* for its bearing on the vital concerns of community, while the place and time of marriage, birth or death have value in their relation to questions both of legal and vital import.

While the importance of such a registry has long been recognized, and a method of securing it has long been in exercise, its inadequacy, its incompleteness, and the absence of any system of indexing, has made it unsatisfactory both to those who have gathered the facts and to those who have had occasion to make search of the record. The laws of inheritance, the requirements of pension laws, of life insurance, and the official seal so often required to authenticate dates of marriage, birth or death, have made it now most essential. Hereafter the Marriage, Birth and Death Records of the State will be of far greater service in establishing rights of property. It will only be culpable negligence on the part of those who are to make returns that will omit the record of any marriage birth, or death occurring in the State. References which it formerly sometimes took hours to verify, can now be made in a few minutes.

It is easy to see that every State should be able to certify those events which have to do with the rights of the individual. The importance of these as a portion of the statistics which all governments are now securing, and their vital bearing on the laws of health, life and population, adds to the necessity and has fully justified the additional care with which such records are now sought and tabulated. Statistics mean the account of how things

stand. This bureau is a central audit of one of the great concerns and resources of the State. It attempts to estimate those vital facts which have so much to do with real prosperity, and to get such information as shall point out how and where our people are suffering from physical disabilities which can be mitigated or avoided.

No sooner had the work of receiving and studying the vital returns been started than it became apparent that the preliminary study must be to prepare a plan of index which should admit of ready reference, for all purposes, whether legal or medical, for which such records are kept. For the first year, under a change in the law, it unavoidably fell to the lot of the medical superintendent to initiate and give direction to this work, and to aid in and provide for the clerical labor needed. A thorough system was adopted, and such full transcription is now made as fully commends itself to the State Board of Health and to all those who have occasion to consult the records.

SECUREMENT OF RETURNS.

The first effort is to secure completeness and accuracy of returns. While we have no reason to complain of any indisposition to fulfill the conditions of the law, any system that looks to the careful collection of vital facts, requires constant vigilance to prevent neglects or oversights. City clerks and assessors, as a rule, have performed their duties with faithfulness and made their returns with commendable promptness. They are sometimes annoyed by delays or neglects on the part of those whose duty it is to send certificates to them. The legal right which the parties have to a record of marriage as well as the requirements of the law, are fully recognized by those who officiate. The former law not only did not pay for a certificate, but practically made it the duty of the person officiating to record the marriage at a county clerk's office, and pay one shilling therefor. This law is much simpler in its process and entails no expense. We only need to urge upon all parties that they see to it that this record is secured and sent promptly to the city clerk or assessor. A neglect may at any time subject to a penalty at law from the parties concerned as well as from the State authorities. A comparison of the returns for the last two years under the former

law as to marriages, and for the first two years under the new law, shows a satisfactory gain as follows:

Year 1877,	Marriages	6,022
" 1878,	"	5,375
Total		11,397
Year 1879,	Marriages	7,096
" 1880,	"	7,935
Total		15,031

Although some of the increase may be attributed to a better financial condition, the increase is mostly in record and due to the greater facility of the present law.

The returns of death, we believe, are very complete under the present methods. When the alteration was made for townships, by which the certificate of death, in case of death or burial outside of city limits, would serve as a permit, if returned within five days, it was feared that this might lead to carelessness on the part of undertakers in making their returns. A few cases have been reported to us in which the undertaker has not procured the certificate until after the burial. The law, with its present wording, gives no unnecessary trouble, and undertakers need to know that the intention to procure a certificate very soon is not enough. All sextons and keepers of cemeteries must see either the permit or certificate of death before the burial. For any neglect or delay the full responsibility rests with those in charge of the funeral.

Boards of Health should furnish us with the names of any undertakers who are careless in this regard, or should draw their attention to the remissness.

It is satisfactory to find in a study of the certificates of death, that care is taken in stating the causes of disease. It is unavoidable that in rare cases there is doubt, or that some practitioners betray a tendency to indefiniteness, which is a defect of education or experience, rather than of intent. But no one can handle 20,000 of these certificates without seeing that these sources of error are largely overcome by the general reliability and exactness of return. Where there has been reason to object

to vagueness of return in causes of death, they have been chiefly such as these.

Congestive chill and congestive fever are not good terms, unless under the secondary heading there is some reference to the supposed cause. General debility for a child, over one month of age, or for a person under the age of sixty, is also too vague. Fever alone is too indefinite.

Teething should have added thereto, the prominent symptom, as diarrhœa, convulsions, etc. Marasmus often needs a secondary noting. A return of septicaemia or pyaemia should state the organ involved, if there is a local abscess or other organic lesion.

NOMENCLATURE.

It is a question which must early have the attention of our medical men and of vital statisticians, whether some change is not desirable in the accepted nomenclature of disease. When the English classification was adopted, it was not without careful study and examination by committees which represented the best talent of the nation. While, therefore, no abrupt changes should be made, it is admitted that new diseases, or new types of old diseases, or new knowledge as to diagnosis, should introduce some changes. Our own country adopted this nomenclature because we had none of our own. There are diseases special to our own continent and others, greatly modified by locality, and such as need more careful noting.

An important conference of vital statisticians from many of the States was held in May last at Washington, under the auspices of the National Board of Health. Under its order correspondence is now being had on this subject. It is probable that some changes will be made, or that there will be some adaptation to our changed American conditions. As it is also very desirable to have that uniformity by which the States can be compared with each other, an effort is being made to unify the systems now used and thus make the whole available for the general government.

It is now evident that medical science is gaining aid from numerical methods of study; that sanitary science is largely guided by such data, and that both are giving prominence and success to medical art. It is now scarcely necessary to show to

the physician that benefits accrue to himself and to his profession as well as to society at large, from a close study and classification of disease.

In reference to the returns of births, it will ever be the case that there are some neglects. Those who are in the habit of carrying a few blank forms in the pocket, and who make the record at the time of attendance, find it little trouble, while those who leave cases to collect, and then have not the data at command, may easy make a burden of what would otherwise be too trivial to mention. Yet it is a pleasure to say that the evidences of co-operation and of increasing interest are manifested both in the increase of returns and in the active efforts of local practitioners. Where there is imperfection of returns we already have enough localities in which there is greater completeness to serve as a standard of comparison. For instance, Paterson shows a birth rate so much larger in proportion than Camden, and is so much more approximately correct, that with it and four or five other cities to guide, it is not difficult to arrive at what the birth rate of the latter should be. Especially as now a quinquennial census and local enrollments are likely to aid us in the correction. These cannot take the place of the record of an event at the time either as a legal or vital fact, but greatly aid in arriving at correctness of conclusion. Also the deaths under one year, added to the living in any one year, enable us still more closely to reckon the birth rate.

The importance of having the birth rate in order to know the significance of the death rate, is apparent from the fact that we must know the age of the material with which death is dealing. A mortality of 30 to 1,000 among adults is quite different in significance from what it is among children.

A very large infant mortality, especially in the summer, is one of the greatest indices of the prevalence of avoidable causes of disease. Mr. Edmunds, in his article in the *Lancet,* has also shown how mortality bears a certain relation to sickness at each age. In the English computation it is found that "for every annual death, two persons are suffering from sickness of a severity that disables laboring men from work." Mr. Neison for friendly societies, which exclude children, computed 2.5 constantly sick to one death under 60. Taking into consideration the number of sick that recover if every death stands for over 600 days of sick-

ness, it is easy to see how avoidable sickness is a heavy tax on all industrial and social interests.

STATISTICAL INQUIRIES OF THE GENERAL GOVERNMENT.

It is encouraging to all State and Local Boards of Health that the General Government is, in connection with the late Census, giving such attention to these vital returns. The regional and mortality maps of the last Census were published with an announcement of their incompleteness, but were of very great value as showing the outreach and feasibility of effort to study the zones and habitats of disease. Gen. Walker, under the direction of Congress, made elaborate arrangements to collect more accurate data for the tenth Census. He has so far recognized the value of the methods and returns of this State, that it is one of the two or three he has called upon to aid in furnishing standards of comparison by which to rate sectional defects. It only needs that the plans now adopted be followed out by us, with such additions as experience may suggest in order, in due time, to secure an amount of reliable statistical data that can be made available in many directions. It is probable that some changes will be agreed upon and therefore we can await these.

USES MADE OF STATISTICS.

The Registrar-General of England says, that such a system has enabled the government to acquire a general knowledge of the state of the population of the kingdom. Studying thus the causes that influence the health of the people, we are able to point out local defects and to guard against the evils which cause unnecessary sickness and untimely death.

Parkes, the leading sanitary author of England, shows that "the attention now paid to public health is in a large degree owing to the collection of the statistics of births and deaths, and the causes of death which have been collected in England for the last thirty-eight years. It may truly be said, indeed, that not only all Europe, but gradually the entire world has been influenced by the work."

Its direct practical bearing becomes at once apparent when, as Dr. Elisha Harris expresses it, we note of "the fact that the death rate of living people fluctuates from eleven to forty, fifty,

sixty and eighty per thousand each year in different places, the fluctuations being directly chargeable to the locality, the domestic, the personal and certain avoidable vital conditions of the population which present these variations in excess of a minimum rate of mortality."

It is also to be borne in mind that the discovery by Dr. Snow, of London, as to the relation of water-supply to cholera and those as to the dependency of typhoid fever on fecal contaminations were directly the result of the statistical method of inquiry. The consequence has been, as to the more general diseases, that, "in many cases, those districts which the statistical returns showed to be in the worst conditions have come to be the best," just because the exhibit of figures and facts aroused the local authorities to action.

In our own country, Massachusetts and Michigan, as well as some of our most populous cities, have much profited by these returns. Many of the zymotic diseases have had the line of their incidence traced, although so much remains to be discovered. "It is not too much to say that modern sanitary science owes its existence to the registration of deaths and the localization thereby of insanitary conditions"—Mass. Rep., 1877. Dr. Bowditch, in an analysis of 45,000 cases of consumption, has been able to show a very close connection between soil dampness and the prevalence of that malady. These are but illustrations of series of facts which are being tabulated and arranged by close observers as carefully as are the statistics which aid in the study. Political economy and industrial interests no longer need to be persuaded that such studies are within the range and the duty of statesmen. The Austrian Minister of Commerce has well stated it: "Statistics is no longer to be viewed as a mere theoretical science for the gratification of the learned, since, on the contrary, it subserves the practical ends of political society and lends its service to administration, as well in determining the lines of existing institutions and laws, as in weighing measures not yet carried out."

In the early collection of statistics for any State where there are no previous records as to vital facts which can be satisfactorily used, the first point is to collect as far as possible all facts which, in the judgment of statisticians, are likely to be useful in future inquiries. From many of these it would be futile to

attempt to make deductions until enough had been gathered through series of years and in different localities for legitimate comparisons. It is important on the one hand not to multiply items, and on the other not to omit such as are likely to be of service. There is much therefore to be transcribed which does not become immediately available. Yet that especially which relates to disease and death has easy and important lessons.

As comparisons need to be made with the tables of other cities, states and countries, some uniformity of method is to be sought. It was for this that at the late Statistical Conference a committee was appointed to review all forms and adjust them so as to make them comparable.

One of the effects of a central bureau should be to stimulate our larger cities to a close local study of their vital returns. It would require but little additional appropriation to that now required by State law, and would enable them to know the ward and street localities of disease, in such a way as to be of great practical service. The weekly rate of mortality is too often a mere item of news. But if the city board of health is studying it, and inquiring as to causes, experience fully shows that the result is the controlling of epidemics and the abatement of disease. Such large cities as Newark, Paterson, Trenton, Camden, etc., should certainly add to their health force, a method by which the weekly and ward returns can be studied, with the view of localizing the sources of disease, and so remedying existing evils.

METEOROLOGY.

The records of meteorology are imparted in the study of disease. For this, and other reasons, the State Board of Health endeavors to secure weather records at a few stations, which it is hoped may yet be studied in their bearings upon the health and diseases of the people. For the last two years our closest observers have seen much reason to connect prevalent epidemics with climatic conditions. The intensity of yellow fever seemed to have much to do with the notable atmospheric and telluric conditions of 1878–9. The great mildness of the last winter, followed by the almost summer heat of April and May, and the great drought which even interfered with corn-planting, seems to have had considerable relation to the prevalence of fevers,

especially of a periodic type. While we cannot vacate climate or control the seasons, such facts warn us that it is not safe to keep in store the materials for fermentive and putrefactive decay, either animal or vegetable. We should interrupt the results by seeing to that part which falls under our jurisdiction. Or if we have neglected so as to have the accumulations in such seasons, our only relief is to betake us to the mountains or the sea. Unfortunately, large portions of our population cannot do this, and are therefore interested in having healthy homes for all the year.

METHODS OF STUDYING STATISTICS.

While the English and Continental methods of dealing with statistics are valuable as guides, it is evident there needs some modification, when we come to deal with our changed populations. The tides of emigration and the migrations from State to State need to be taken into consideration.

Occupations, which in the technic methods of foreign trades give reliable data, are so often changed by our people that conclusions therefrom need to be studied in classes, rather than from general returns alone. The record of occupation at marriage is more reliable than to take the given occupation in the death certificate, since it is more likely to give the trade or chosen calling.

In the study of the effect of occupations on disease, we believe it will be found more practicable to follow out the history of named employes in specified industries for long periods, than to rely wholly on the death record.

In the study of nationality we have not only to do with the effects of heredity and race, but with the results always incident to emigration, both in the exposures of change and in the risks of acclimatization. Emigrants, for instance, fare badly who arrive in summer and fall and at once resort to crowded cities or to marshy districts. Even changes from one climate of our own country to another are not so desirable at such seasons.

In the study of the causes of pauperism, crime or dependency it would be valuable to know how many children are left in partial or complete orphanage under twelve. Some of these points have to be omitted lest the certificates become too prolix. Suggestions occasionally come to us as to additions to record, which

show an interest in the subject. The index is now in such a form as to be available to local health officers and statisticians who may need to study local questions.

STILL-BIRTH RETURNS.

The record of still-births, for obvious reasons, can never be entirely complete. But the value of the record, and the benefit to society, of the attempt to obtain the record, is already apparent. It is well known that many children perish not by evil intent, but by want of skilled attendance at the time of birth. Sometimes the mother, too, falls a victim, and living children are made orphans.

While we cannot advocate too stringent legislation, it is well when there is some restraint on carelessness, unskillfulness and neglect. We are already made aware by physicians that their aid is sooner sought in perilous cases, and that the general effect of the law is salutary. The highest interests of the people require that the sacredness of child-life should be felt, and that all criminal interference or all neglect at time of birth should be prevented, both by public sentiment and by proper enactment. As attempts at concealment rarely succeed, a record is but the authentication of orderly attendance. The neglect of it is the only ground of suspicion, except in the instances where the frequency of the misfortune in the hands of midwives gives rise to the fear that so-called experience, without educated skill is now and then a peril both to mother and child.

RELATIONS OF LOCAL BOARDS OF HEALTH TO VITAL STATISTICS.

Section five of the law of March 11, 1880, concerning the protection of the public health, directs local boards of health to take cognizance of any neglect to make vital returns on the part of those upon whom this duty devolves. When there is such neglect, the city clerk or assessor may at his discretion see the person or address the bureau of vital statistics, or make complaint to the local board of health. The local board may then insist upon the returns being made, or bring action for the neglect. While cases may occur in which either the local or the State authorities may need to appeal to the law, we do not believe there is any deliberate intent to neglect on the part of the negligent

Yet it is very important that full returns be secured. The local boards should therefore not fail, both by the weight of their influence, and by special committee, if need be, to secure this object. The importance of these returns in the study of local health conditions, and of the state of the population through series of years, has certainly not been over-estimated, and has been fully tested in many nations. These local boards should therefore insist upon the legal right which every one has to this record, as also upon the need of it for local health-information. A case has recently come to our notice in which the parents of a child had serious ground of complaint because the medical attendant had omitted the record. With our foreign population, especially, it may at any time cause such embarassment as to cause both parents and attendant equally to regret the oversight.

The whole number of deaths reported from July 1, 1879, to July 1, 1880, is 18,967, against 20,440 for the previous year, being a record of deaths of 1,473 less than for the year ending July 1, 1874.

A general comparison shows that while there has been some diminution in the class generally known as zymotic, it has not been quite in proportion to the aggregate decrease. We shall briefly notice those diseases which appear in the special schedule.

REMITTENT FEVER.

This has a record of 293 against 268 cases of last year. The death record of this fever is generally accurate, with the exception that there is some doubt as to the placing of fevers returned as typho-malarial. These are usually placed with typhoid fevers, since it is the predominence of this element that usually leads to this nomenclature. It is well, however, in comparison, to pay some attention to the comparative record of typhoid fever. The greater prevalence of malarial disease commenced in the summer of 1878 and was intensified in 1879 and still worse in the summer and fall of 1880. In 1860 and 1861 the State Medical Society made a careful inquiry into the division of miasmatic diseases, now generally called malarial. They were found, at that time, not to be generally prevalent in the State. The years 1855 to 1858 had shown a large prevalence of this class of fevers. Since then no record of the disease has been so extended as for the past two years.

One cannot study the mortality record, and especially by the light of the reports of local boards of health, without perceiving that this period has been characterized to an unusual degree by these periodic fevers. The increased number of remittent and typho-malarial fevers proving fatal, stands for a large number of cases in such a class of disease. Other evidence also shows itself in certificates or reports, even where the record of death does not reveal the great disturbing element; while in such periods the influence of malaria is more extended, yet its points of concentrated powers are not less readily distinguishable. The borders of sluggish, impeded streams, where there is much waste material accumulated, stagnant or artificial lakes and ponds and marshy districts are the breeding places and the haunts of this prolific poison. The finding of a mosquito, or a swarm of them, on the mountain top does not deceive us as to its habitat. As little doubt is there as to the homes and resorts of what has so long been called paludal or marsh fever. Until we shall have secured some general law for drainage, and guard against the collection of great deposits of vegetable matter where moisture, heat and varying exposure ferment and putrefy it, we may expect a malarial influence which will make its mark on the general health of our population and upon family thrift, more than is merely tabulated in one of the varied forms of the disease. Many a constitution is so impaired as to find record afterward in untimely death by other diseases.

TYPHOID FEVER.

This numbers 373 cases, or an excess of 49 cases over the previous year. It is more identified with houses in close vicinage, and results largely from sewers, impure water and human excreta. Just as this report is being printed, a series of cases are occurring in an alms-house in Camden county, where typhus, as a well declared disease, is to be found. A fuller account will appear in the next report. It cannot be concealed, that malarial fevers are more frequent in some cities than formerly, and that we need closely to study the relations of the remittent and typhoid poisons with a view to their diminution, as also to determine the results of their united action on the same individual, or their possible combinations of influence upon the

atmosphere. We shall, ere long, be able to compare cities among themselves and rural and city districts, to see if a more accurate law as to prevalence can be substantiated.

SMALL-POX.

Last year we had not occasion to record a single death, although a very few cases occurred. This year we have also record of sporadic cases in localities where no death has occurred. There were several cases and some deaths in Salem city.

The chief epidemic has been in Camden city. As but few of the deaths occurred before July, the chief record will be in the next report. The authorities were tardy in dealing with the first cases of the disease and in securing general vaccination. When preventive measures were entered upon with vigor the cases and the mortality were diminished. Many of our cities still choose to repeat the experiment of waiting for an epidemic in order to secure general vaccination. The consequence is, that just as fast as a new crop of children can be found between five and ten years of age, the small-pox is sure to find material enough upon which to flourish. Some false conclusions are thus drawn as to the tendency of epidemics to occur at stated intervals of about seven years. We need much a public opinion which will consider neglect of vaccination a wrong, and which will at least compel it in the case of all identified with public schools. Because education is free that ought not to give the right to parents to make small-pox a free gift also. They are under obligations not thus to expose the children of others, while availing themselves of an educational gift, intended to be for all. The use of bovine virus removes the fear or prejudice as to human vaccine, but there is need that its source be assured, lest dishonest dealers substitute the human for the bovine lymph. We are at present making some inquiries into the reliability of supply and the care taken by those who advertise to furnish it fresh and pure each week.

SCARLET FEVER

has not been so prevalent as the former year, registering 573 instead of 627 deaths. Some of these latter must be associated with the epidemic of the former year. While no antidote exists

to the poison, isolation, avoidance of close rooms, proper airing and disinfection do much to limit the disease. Where a case occurs in a family, many now adopt a prophylactic treatment for other members of the household.

Cleansing gargles and washes have their sphere of use upon individuals, as well as upon surroundings of the patient, and internal remedies seem often to avail. No disease needs more careful and skillful care on part of the attendants, and there is no good reason why so many cases should occur.

MEASLES.

This ranks next to small-pox as the most contagious of the exanthems or skin zymotics. Although it is sometimes attended with a large rate of mortality, only 87 deaths from it are recorded this year, as against 77 of last year. It now seems strange to us that scarlet fever could ever have been classified with it. It is not strange that röthlen, or the so-called German measles, is sometimes taken for it, and so two attacks credited oftener than should be. It is a disease whose study is most important both in itself and in its bearing on acute and chronic lung affections.

WHOOPING COUGH,

has a mortality of 277, or 140 more than the previous year. In England it has, within the last three years, registered a much larger death rate than usual. It is one of those diseases which is probably often conveyed by the spittle or mouth secretions, which should not be concealed in handkerchief but find their place in some vessel having a disinfectant solution in it. It is largely under the control of medicine, and often neglected by parents with the idea that it is not dangerous. Even in recovery the lungs are often impaired by the dilitation which the air tubes or cells have suffered.

CROUP AND DIPHTHERIA,

the last year numbered 873 instead of 1,100 deaths; but the total is distressingly high. The observations of Wood and others seem to show that it is peculiarly a septic disease and depends much for its mortality, as well as, perhaps, for its inception,

upon abnormal and specific decomposition. Heat, moisture and filth fructify many kinds of disease and have very marked influence on the disease.

It is probable we shall yet find that sewer gas is not the chief factor, as it is a disease of the country as well as of cities, and that spores or animalculæ which flourish out of sunlight and in damp houses and amid peculiar atmospheric conditions, have much to do with the frequency and violence of the malady.

We think it is becoming more and more evident that croup and diphtheria do not differ in their pathological results, although difference arises from the seat and degree of exudation, and as to the local and constitutional character of certain epidemics.

DIARRHŒAL DISEASE,

showed an increase of three hundred and seventeen over the previous year. Both summers have been remarkable for high temperature and for certain conditions of humidity. There are so many factors that enter into the causation of diarrhœal disease as to render it necessary to study cities and country, and different cities, in comparison, with the inferences for a State aggregate.

CONSUMPTION.

The record of last year was 1,849 deaths; of this year, 2,166. It is high time that this disease took a more conspicuous place in the study of preventible diseases. The number of its victims is far greater than the usual feared diseases of children, while it generally removes those further advanced to adult life. The cure of the disease solely by medical treatment has not made great progress of late. But it is quite different as to our knowledge of causes and our powers of limiting the tendencies thereto. Damp soils and sudden changes of temperature are known as exciting causes. Acute and chronic pneumonia not infrequently start the tubercular deposit or prepare the system for its activity.

The law of heredity is better understood, so that by proper dealing with the child the tendency is overcome.

Air fouled either by gases or organic particles, or laden with fine dust of any kind, when breathed into the lungs is more or less an irritant. Where there is in it nothing to induce specific disease, both by lowering the tone of the system and by its local

irritation amid the delicate structures of the lungs, it gives rise to conditions favorable either to tubercular deposit or to the development of disease, of which the initial plasm is already deposited. Hence, there is no disease more worthy of the close study of the sanitarian, and of every one who would remove more fully from the risks of life one of its greatest perils, both from their own relation and from their own excessive mortality.

ACUTE LUNG DISEASE

also needs the sure, close study and observation. The record is 1,988, or 172 less than the former year. Adding these to the deaths by consumption, we have for lung disease an aggregate of 4,154, making over one-fourth of all of the diseases of special classes and over one-fifth of all the fatal diseases of the State. Surely in a State of such large industrial and factory development, political and social economy require us to look well to this deterioration of stock and vigor, as well as to the actual number of deaths. The deaths from the

BRAIN AND NERVOUS DISEASES

of children numbered 1,638, or 9 more than the previous year. This includes the large number of which convulsions form a frequent symptom. Adding to these 1,347 of adult brain diseases, an increase of 33 over the former year, and forming an aggregate of 2,985, it is well worthy of study how far the immense tax of this active age is increasing the liability to shock upon that high nervous organization with which mankind is endowed.

THE HEART AND CIRCULATION,

numbering 982, or an increase of 10 over the previous year, is also worthy of study in the same direction.

It is well known to physicians that rheumatism is often the excitant of heart disease, by the changes produced in the valves of the heart during its attack. Of this 66 deaths were recorded this year and 76 the previous year. From the fact that few die from acute rheumatism directly, the mortality it causes through heart disease is overlooked. It is now believed that the early and free use of salicylic acid in the beginning of the acute stage,

will often prevent those structural charges on the heart, which in later life produce death. If so we should ere long find a diminution of heart disease from this cause.

URINARY DISEASE.

These are marked by us in the office schedules so as to distinguish between those of the kidney and the bladder. Most of those tabulated come under disease of the kidney, and is generally returned as Nephritis or Bright's Disease. The studies of this disease have not merely reference to this one organ, for the lesion is often only secondary to disease of the brain, or nervous system, to failure in the digestive efforts, and to the use of intense irritants, of which alcohol and the various highly seasoned sauces are the representatives.

CANCER.*

The gradual increase of cancer, as a constitutional and distinctive disease, has been noted in the English returns and seems repeated in our own experience. Four hundred and twenty-five cases of the disease may seem small when compared with some of the other diseases; but it is believed to be more uniformly transmitted to offspring than almost any other malady and has an intricacy of history, as to causation and extension, that render it a subject for close study. We are watching, with interest, some returns that seem to indicate its more frequent occurrence in some sections than others, but it is too soon to even speak of probabilities.

PUERPERAL FEVER

claimed about sixty more victims this year than the last. The loss of a mother too often means a bereft household of little ones, whose orphanage is an affliction not only to the father but to society. The undoubted evidence we have of the communicability or portability of this disease, and its relations to erysipelas call for its closest study in the interests of State hygiene.

We desire to direct the attention of all those interested in Vital Statistics, to the importance of comparisons of cities and the country as to these various diseases, and also to comparison of various other districts with each other as preparatory to that

more extended study which will be desirable, when the number of data will exclude those sources of error which are not eliminated in small comparisons. Many of our physicians, as well as other citizens, are already seeing how important are the records thus secured. While there will be some crude deductions and inferences even on the part of those who lay claim to something of expert skill, yet it is enough that where the study has been most profound and the criticism the most searching, there the results have been most satisfactory. The social statist, no less than the physician looks to such records, as the mariner looks to his chart. With all the possibilities of error he knows that experience verifies the credibility of this great numerical map of population, and with graphic outlines works out the destines of families, of races, and of nations. The true student is led less and less to doubt the claim which it has to a place among determinable sciences and positive arts, while he may well question his own ability to grapple with the solution of the great life problems which are involved. The best encouragement of present progress in all directions is that material is being collected which will be of indispensable importance to great social, industrial and life studies, of which more than a preface is already at hand.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS BY TOWNSHIPS.

Atlantic County.

	M.	B.	D.
Absecon	8	18	7
Atlantic City	33	120	93
Buena Vista	4	13	9
Egg Harbor City	20	44	28
Egg Harbor Township	15	52	72
Galloway	12	50	37
Hamilton	7	35	28
Hammonton	14	41	17
Mullica	2	12	12
Weymouth	0	16	11
	115	401	314

Bergen County.

	M.	B.	D.
Engleswood	15	53	78
Franklin	12	28	20
Harrington	9	59	14
Hohokus	24	56	27
Lodi	20	101	63
Midland	5	34	25
New Barbadoes	46	137	79
Palisade	8	42	32
Ridgefield	15	53	41
Ridgewood	14	41	24
Saddle River	2	14	21
Union	8	68	50
Washington	15	62	41
	193	748	510

Burlington County.

	M.	B.	D.
Bass River	10	23	15
Beverly	26	82	54
Bordentown	47	124	90
Burlington	57	135	113
Chester	27	72	38
Chesterfield	3	27	24
Cinnaminson	13	66	41
Delran	5	12	12
Evesham	7	36	17
Eastampton	3	2	0
Florence	9	43	33
Little Egg Harbor	18	44	16
Lumberton	7	27	20
Mansfield	10	35	30
Medford	13	55	29
Mt. Laurel	1	23	17
New Hanover	14	45	23
Northampton	50	96	78
Pemberton	22	74	62
Randolph	1	13	5
Shamong	2	11	11
Southampton	21	38	24
Springfield	6	33	13
Washington	1	15	7
Westampton	1	27	14
Willingboro	2	13	10
Woodland	2	3	3
	378	1174	799

Camden County.

	M.	B.	D.
Camden City	424	716	803
Centre	12	63	41
Delaware	3	21	13
Gloucester	20	61	72
Gloucester City	41	140	84
Haddon	22	55	47
Stockton	29	52	62
Waterford	21	40	25
Winslow	6	56	37
	578	1204	1184

Cape May County.

	M.	B.	D.
Cape May City	22	57	24
Dennis	7	18	11
Lower	13	64	27
Middle	14	63	37
Upper	17	30	27
	73	232	126

Cumberland County.

	M.	B.	D.
Bridgeton	129	205	155
Commercial	9	13	31
Deerfield	10	31	16
Downe	11	23	18
Fairfield	25	77	34
Greenwich	7	17	19
Hopewell	13	31	28
Landis	55	112	93
Maurice River	10	49	36
Millville	90	201	174
Stoe Creek	0	24	12
	359	783	611

Essex County.

	M.	B.	D.
Bellville	16	54	45
Bloomfield	28	117	81
Caldwell	15	42	36
Clinton	22	46	38
East Orange	34	164	101
Franklin	11	32	21
Livingston	2	19	18
Millburn	13	30	20
Montclair	40	120	81
Newark	1141	3518	2558
Orange	108	429	216
South Orange	20	86	49
West Orange	12	42	41
	1462	4699	3295

Gloucester County.

	M.	B.	D.
Clayton	23	57	34
Deptford	4	40	22
Franklin	13	60	34
Glassboro	15	70	30
Greenwich	16	70	52
Harrison	14	75	27
Logan	6	20	19
Mantua	7	40	23
Monroe	5	35	35
Washington	14	44	18
West Deptford	4	30	26
Woodbury	28	52	27
Woolwich	16	45	28
	165	638	375

Hudson County.

	M.	B.	D.
Bayonne	32	190	141
Guttenberg	10	11	27
Harrison	6	132	129
Hoboken	193	784	734
Jersey City	705	1523	2533
Kearney	8	35	24
North Bergen	9	34	164
Town of Union	45	142	121
Union	8	15	29
Weehawken	8	15	35
West Hoboken	14	143	88
	1028	3024	4025

Hunterdon County.

	M.	B.	D.
Alexandria	8	30	17
Bethlehem	10	87	45
Clinton	7	38	11
Delaware	24	58	31
East Amwell	12	85	24
Franklin	12	28	17
Frenchtown	13	19	10
High Bridge	14	50	21
Holland	8	45	28
Kingwood	1	44	15
Lambertville	42	79	78
Lebanon	33	52	36
Raritan	30	64	43
Readington	21	72	40
Tewksbury	23	40	19
Town of Clinton	9	11	12
Union	7	17	10
West Amwell	2	20	18
	276	739	475

Mercer County.

	M.	B.	D.
Chambersburg	39	98	109
East Windsor	17	48	35
Ewing	6	28	30
Hamilton	20	61	54
Hopewell	38	88	41
Lawrence	14	59	47
Princeton	24	105	81
Trenton	326	568	618
Washington	6	15	18
West Windsor	6	16	15
	491	1071	1048

Middlesex County.

	M.	B.	D.
Cranberry	20	33	28
East Brunswick	17	92	48
Madison	4	17	22
Monroe	27	50	44
New Brunswick	116	458	269
North Brunswick	11	27	20
Perth Amboy	22	204	83
Piscataway	26	70	46
Raritan	19	50	46
Sayreville	1	17	26
South Amboy	15	61	52
South Brunswick	13	56	49
Woodbridge	10	80	44
	301	1210	777

Monmouth County.

	M.	B.	D.
Atlantic	9	24	6
Eatontown	28	52	41
Freehold	54	77	67
Holmdel	7	21	13
Howell	29	74	44
Manalapan	12	38	34
Marlboro	10	38	27
Matawan	18	62	48
Middletown	24	93	62
Millstone	24	43	34
Neptune	38	88	63
Ocean	46	156	83
Raritan	42	87	61
Shrewsbury	52	139	73
Upper Freehold	19	56	49
Wall	48	121	47
	460	1169	752

Morris County.

	M.	B.	D.
Boonton	28	38	48
Chatham	14	69	74
Chester	15	64	28
Hanover	14	54	41
Jefferson	6	41	27
Mendham	11	28	21
Montville	6	28	10
Morris	89	180	128
Mount Olive	22	55	26
Passaic	5	82	16
Pequannock	18	47	27
Randolph	61	140	108
Rockaway	47	168	90
Roxbury	18	47	38
Washington	11	76	18
	810	1012	685

Ocean County.

	M.	B.	D.
Berkeley	8	15	12
Brick	21	56	42
Dover	17	49	24
Eagleswood	5	15	7
Jackson	14	36	19
Lacey	12	19	7
Manchester	7	29	11
Ocean	2	8	3
Plumsted	9	49	16
Stafford	9	25	8
Union	4	18	13
	103	319	162

Passaic County.

	M.	B.	D.
Acquackanonk	4	35	28
Little Falls	9	17	31
Manchester	2	13	13
Passaic	49	216	142
Paterson	431	1322	1174
Pompton	84	40	21
Wayne	6	23	22
West Milford	81	75	37
	566	1741	1468

Salem County.

	M.	B.	D.
Elsinboro	0	12	11
Lower Alloways Creek	15	11	17
Lower Penn's Neck	20	25	29
Mannington	2	58	49
Pilesgrove	26	62	48
Pittsgrove	11	67	16
Quinton	2	46	20
Salem	33	83	76
Upper Alloways Creek	15	44	23
Upper Penns' Neck	24	97	52
Upper Pittsgrove	8	20	21
	156	525	362

Somerset County.

	M.	B.	D.
Badminster	18	44	22
Bernards	14	59	35
Branchburg	5	27	19
Bridgewater	66	170	104
Franklin	17	60	55
Hillsborough	11	63	44
Montgomery	16	51	18
North Plainfield	7	71	36
Warren	8	19	10
	162	564	343

Sussex County.

	M.	B.	D.
Andover	7	21	8
Byram	20	30	17
Frankford	15	26	25
Greene	1	8	8
Hardyston	14	21	39
Hampton	2	15	9
Lafayette	19	8	8
Montague	5	21	16
Newton	25	53	30
Sandyston	9	24	16
Sparta	13	27	28
Stillwater	17	21	19
Vernon	9	4	14
Walpack	5	17	5
Wantage	16	25	42
	177	321	284

Union County.

	M.	B.	D.
Clark	2	....	2
Cranford	8	10	11
Elizabeth	158	679	440
Fanwood	6	20	16
Linden	5	45	28
New Providence	6	9	11
Plainfield	57	166	98
Rahway	59	132	116
Springfield	6	19	23
Summit	8	40	27
Union	4	48	28
Westfield	14	48	40
	328	1216	840

Warren County.

	M.	B.	D.
Allamuchy	1	4	6
Belvidere	26	41	31
Blairstown	6	42	12
Franklin	21	35	20
Frelinghuysen	11	20	14
Greenwich	18	66	52
Hackettstown	15	46	29
Hardwick	2	12	7
Harmony	4	31	12
Hope	9	81	20
Independence	12	20	12
Knowlton	7	41	19
Lapatcong	4	43	22
Mansfield	9	35	29
Oxford	28	130	78
Pahaquarry	0	10	4
Phillipsburg	58	208	126
Town of Washington	24	55	28
Washington	5	20	11
	260	890	532

Totals of Marriages, Births and Deaths for all the Counties.

	M.	B.	D.
ic	115	401	814
ı	198	748	510
gton	378	1174	799
n	578	1204	1184
Iay	73	232	126
rland	359	783	611
	1462	4699	3295
ster	165	638	375
n	1023	3024	4025
rdon	276	739	475
	491	1071	1048
sex	301	1210	777
outh	460	1169	752
	310	1012	685
	103	319	162
	566	1741	1468
	156	525	362
et	162	564	343
	177	321	284
	328	1216	840
n	260	890	532
tal for the State.	7936	23680	18967

Summary of Totals for whole State for the past three years.

	M.	B.	D.
	5375	19427	14085
	7096	23116	20440
	7936	23680	18967

ler former law.

Return of Deaths from all Causes and certain specified Diseases, in the Counties of the State of New Jersey, for the year ending June 30th, 1880.

COUNTIES OF NEW JERSEY.	DEATHS AT ALL AGES.							Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																			Total deaths from these diseases.	Death rate per 1000 from these diseases.
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.		
Atlantic	90	42	29	76	75	2	314	18,706	16.78	......	1	......	1	......	2	11	52	48	19	19	12	5	29	1	29	10	1	4	....	....
Bergen	110	67	50	172	107	4	510	36,790	13.86	22	7	......	10	1	4	10	46	94	58	38	25	18	40	5	31	14	......	6	....	....
Burlington	165	93	77	224	230	10	799	55,403	14.42	8	16	1	4	......	5	53	68	150	60	47	61	30	59	10	52	15	5	13	....	....
Camden	338	168	115	347	206	10	1,184	62,941	18.81	11	35	10	13	1	9	45	185	168	108	87	61	24	78	2	53	30	1	11	....	....
Cape May	37	19	17	22	29	2	126	9,765	12.90	1	4	......	8	......	3	7	21	12	8	13	1	3	11	1	10	7	1	......	....	....
Cumberland	148	90	43	160	165	5	611	37,694	16.20	2	13	......	18	......	5	36	65	108	71	37	25	9	45	2	38	17	3	7	....	....
Essex	800	461	286	1,130	613	5	3,295	189,819	17.35	67	90	......	43	7	15	172	384	511	413	303	165	110	239	16	143	76	7	39	....	....
Gloucester	91	47	32	103	98	4	375	25,886	14.48	6	13	......	7	1	2	21	35	45	39	19	25	8	28	1	33	7	3	2	....	....
Hudson	1,034	812	407	1,287	478	7	4,025	187,950	21.41	86	50	......	211	34	25	237	486	516	448	532	183	114	177	22	162	67	12	54	....	....
Hunterdon	75	52	51	134	158	5	475	38,568	12.31	2	14	......	8	......	4	30	39	67	43	11	43	8	64	1	28	13	3	3	....	....
Mercer	219	120	119	331	235	24	1,048	58,058	18.05	5	19	......	88	3	7	13	91	174	85	63	53	23	87	6	72	20	3	13	....	....
Middlesex	201	93	75	213	191	4	777	52,286	14.86	16	11	......	8	6	2	36	87	102	83	47	37	25	54	6	38	23	1	5	....	....
Monmouth	195	87	56	193	206	15	752	55,535	13.54	1	8	......	6	......	5	22	102	178	44	57	42	24	50	2	56	15	2	15	....	....
Morris	143	86	52	210	185	9	683	50,867	13.26	20	10	......	10	10	7	18	60	87	91	43	42	21	80	4	40	20	4	14	....	....
Ocean	33	16	14	50	48	1	162	14,455	11.20	1	4	......	1	......	4	6	12	28	11	6	6	1	17	2	18	5	2	2	....	....
Passaic	377	288	182	395	220	6	1,468	68,716	21.36	12	22	......	85	22	11	70	238	180	146	137	64	32	72	11	56	28	3	19	....	....
Salem	76	33	39	98	110	6	362	24,580	14.72	2	8	3	2	......	9	15	29	49	46	16	11	8	38	7	24	12	2	6	....	....
Somerset	71	31	22	99	118	2	343	27,161	12.62	5	2	......	2	......	1	4	28	44	39	21	29	15	34	5	28	11	5	4	....	....
Sussex	39	30	39	81	92	3	284	23,553	12.05	7	12	......	15	......	......	8	11	38	37	21	15	5	35	1	12	8	2	5	....	....
Union	204	109	61	261	200	5	840	55,571	15.11	15	18	1	3	2	12	32	86	115	83	60	51	17	73	2	45	21	2	15	....	....
Warren	120	97	50	139	117	9	532	36,588	14.54	4	16	......	30	......	5	21	41	50	56	61	30	16	38	2	37	6	2	7	....	....
	4,506	2,841	1,816	5,725	3,881	138	18,967	1130,893	16.77	293	373	15	573	87	130	873	2166	2714	1988	1038	982	516	1347	109	1005	425	64	244	15,642	13.74

Return of Deaths from all Causes and certain specified Diseases, in the Cities of the State of New Jersey, of over 5,000 for the year ending June 30th, 1880.

Incorporated Cities of the State having by the Census of 1880 over 5,000. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.	Total deaths from these diseases.	Death rate per 1000 from these diseases.
Burlington Co.																														
Bordentown	14	10	10	29	27	......	90	5,334	16.89	......	1	......	......	......	1	1	9	24	6	11	9	4	4	......	5	1	......	2	......	......
Burlington	22	18	12	36	22	3	113	7,237	15.61	......	1	......	1	......	......	3	12	28	12	5	5	8	8	2	4	......	1	1	......	......
Camden Co.																														
Camden	226	131	85	246	106	9	803	41,658	19.27	6	25	10	9	1	7	37	120	115	71	66	37	17	51	......	25	24	1	6	......	......
Gloucester City	28	14	6	22	14	......	84	5,347	15.70	......	1	......	......	......	1	6	18	17	5	6	3	......	5	......	3	1	......	1	......	......
Cumberland Co.																														
Bridgeton	48	15	11	43	38	......	155	8,729	17.75	......	2	......	4	......	3	9	21	28	14	9	6	4	10	2	6	3	1	4	......	......
Millville	39	55	15	38	24	3	174	7,660	22.71	......	2	......	13	......	......	21	28	36	22	10	3	3	6	......	8	1	1	......	......	......
Essex Co.																														
East Orange	22	10	13	26	30	......	101	8,349	12.09	2	7	......	1	1	......	3	11	15	11	4	8	4	4	2	4	......	......	4	......	......
Newark	641	373	222	890	414	4	2,553	136,400	18.71	48	72	......	35	3	11	144	298	396	308	251	121	82	178	5	115	62	5	27	......	......
Orange	53	30	22	77	32	......	216	13,206	16.35	2	3	......	2	1	1	3	39	47	37	16	6	4	13	2	10	4	......	1	......	......
Hudson Co.																														
Bayonne	37	33	2	53	16	......	141	9,372	15.04	1	......	......	3	......	2	10	19	22	14	16	5	1	5	1	6	3	......	2	......	......
Hoboken	208	150	64	244	68	......	734	30,999	23.71	5	8	......	23	5	6	49	107	76	93	192	37	27	28	7	29	12	3	13	......	......
Jersey City	644	525	267	798	295	4	2,533	120,728	20.98	57	31	......	148	23	16	164	292	344	269	205	114	66	109	12	101	35	8	31	......	......
West Hoboken	27	14	8	25	14	......	88	5,441	16.17	1	2	......	3	......	......	4	9	7	8	16	8	1	1	......	6	3	1	1	......	......
Harrison	30	17	14	53	13	2	120	5,510	23.41	7	2	......	1	1	......	......	11	20	19	12	6	3	6	......	5	2	......	2	......	......
Town of Union	26	41	17	23	14	......	121	5,849	20.04	4	2	......	17	3	......	5	14	12	9	14	4	3	7	......	4	3	......	1	......	......
Mercer Co.																														
Trenton	138	75	75	196	118	16	618	29,910	20.66	5	5	......	66	1	2	6	54	108	43	40	31	16	38	3	33	11	3	7	......	......
Chambersburg	25	14	19	38	9	4	109	5,437	20.04	......	5	......	14	1	2	2	9	17	12	7	3	......	6	1	7	2	......	1	......	......
Middlesex Co.																														
New Brunswick	93	32	24	65	55	......	269	17,167	15.66	2	6	......	1	6	......	8	45	36	27	24	14	9	17	4	13	11	......	1	......	......
Morris Co.																														
Morristown	22	11	6	52	36	1	128	6,838	18.71	2	......	......	......	......	......	4	17	19	9	6	6	5	34	......	5	3	1	......	......	......
Passaic Co.																														
Passaic City	43	26	13	44	14	2	142	6,532	21.73	1	2	......	1	......	......	10	22	14	13	22	8	3	8	3	8	1	......	4	......	......
Paterson	305	247	152	296	170	4	1,174	50,877	23.07	7	20	......	82	22	11	56	202	152	119	101	48	24	62	3	37	22	2	12	......	......
Salem Co.																														
Salem	23	8	10	18	16	1	76	5,057	15.02	......	1	......	......	......	2	8	10	8	8	1	......	......	8	......	6	......	......	3	......	......
Union Co.																														
Elizabeth	110	74	36	131	86	3	440	28,229	15.58	5	6	......	2	2	9	24	52	49	44	30	24	7	35	......	21	11	1	7	......	......
Plainfield	24	9	10	36	18	1	98	8,126	12.06	2	4	......	......	......	......	2	13	19	9	7	5	3	9	......	5	1	1	3	......	......
Rahway	32	8	5	34	37	......	116	6,454	17.97	2	......	......	......	......	2	1	9	26	12	6	7	......	10	1	15	5	......	1	......	......
Warren Co.																														
Phillipsburg	39	25	21	21	20	......	126	7,180	17.54	......	2	......	15	......	3	11	9	11	6	22	3	2	10	......	10	1	......	1	......	......
	2,921	1,963	1,139	3,543	1,706	57	11,331	583,626	19.41	159	210	10	441	70	79	591	1450	1646	1200	1168	521	296	667	48	491	222	28	136	9,433	18.15

Death Rate per 1000 *of Counties, Based on Census of* 1880, *for period from June* 30*th*, 1878 *to June* 30*th*, 1879.

(As the present census affords the most correct estimate of population for the previous year, we give a re-calculation of the death rate for the year ending July 1st, 1879, on this basis, in order to aid in future comparisons.)

COUNTIES.	Deaths.	Population.	Death rate, per 1000.
Atlantic	302	18,706	16.14
Bergen	636	36,790	17.28
Burlington	989	55,403	17.85
Camden	1,059	62,941	16.82
Cape May	120	9,765	12.28
Cumberland	628	37,694	16.66
Essex	3,947	189,819	20.79
Gloucester	431	25,886	16.64
Hudson	3,957	187,950	21.05
Hunterdon	527	38,568	13.66
Mercer	1,109	58,058	19.10
Middlesex	837	52,286	16.00
Monmouth	926	55,535	16.67
Morris	829	50,867	16.29
Ocean	217	14,455	15.01
Passaic	1,287	68,716	18.72
Salem	392	24,580	15.94
Somerset	429	27,161	15.79
Sussex	330	23,553	14.01
Union	966	55,571	17.38
Warren	522	36,588	14.26

Death rate per 1000 of whole State 18.67

Death rate per 1000 of specified diseases 13.96

Death Rate per 1000 *of Cities, Based on Census of* 1880, *for period from July* 1*st*, 1878 *to July* 1*st* 1879.

CITIES.	Deaths.	Population.	Death rate, per 1000.
Burlington county.			
Bordentown	86	5,334	16.12
Burlington	154	7,237	21.27
Camden county.			
Camden	673	41,658	16.15
Gloucester City	72	5,347	13.46
Cumberland county.			
Bridgeton	133	8,729	15.23
Millville	137	7,660	17.88
Essex county.			
East Orange	126	8,349	15.09
Newark	3,116	136,400	22.84
Orange	215	13,206	16.28
Hudson county.			
Bayonne	156	9,372	16.64
Hoboken	669	30,990	21.58
Jersey City	2,517	120,728	20.84
West Hoboken	95	5,441	17.46
Mercer county.			
Trenton	653	29,910	21.83
Middlesex county.			
New Brunswick	325	17,167	18.93
Morris county.			
Morristown	114	6,838	16.67
Passaic county.			
Paterson	994	50,877	19.53
Union county.			
Elizabeth	472	28,229	16.72
Plainfield	130	8,126	15.99
Rahway	169	6,454	26.18
Warren county.			
Phillipsburg	102	7,180	14.20

23

Return of Deaths from all Causes, and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of ATLANTIC. Population.........18,706. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Absecon	1			3	3		7	507								1		2					2		1			1
Atlantic City	38	12	5	22	16		93	5,477	16.98		1			1			24	11	2	8	4	3	3	1	7	4		1
Buena Vista	2	1	1	3	2		9	885										1	1		1		2		1			
Egg Harbor City	7	6		6	9		28	1,232							1	1	4	1	3	1			3		2			1
Egg Harbor Township	22	11	5	15	19		72	*3,570								2	16	15	3	4	4	1	7		6	1		
Galloway	9	5	3	12	8		37	‡2,337					1		1		4	7	2	2	1		2		7	2	1	
Hamilton	8	1	6	8	5		28	1,464								3	2	2	3	2	1	1	3		1	1		1
Hammonton	1	1	4	2	7	2	17	1,776								2	1	4	3				3		3	2		
Mullica	1	3	3	3	2		12	717								1		4	1	2			1			1		
Weymouth	1	2	2	2	4		11	741								1	2	1	1		1		3		1			
Death rate per 1000 of county									16.78																			
Death rate per 1000 of county, exclusive of cities over 5000									16.70																			
	90	42	29	76	75	2	314				1		1	1	2	11	52	48	19	19	12	5	29	1	29	11	1	4

*Exclusive of Absecon. ‡Exclusive of Egg Harbor city.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of BERGEN. Population..........36,700 Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Englewood	16	16	7	21	12	1	73	4,076	......	2	1	......	2	......	1	2	12	9	12	7	5	2	3	......	4	1	......	3
Franklin	3	3	4	5	4	1	20	2,206	......	......	......	......	......	......	......	3	1	5	3	2	1	1	1	......	......	1	......	......
Harrington	2	......	......	7	5	......	14	2,570	......	......	......	......	1	......	......	......	1	5	......	......	......	......	4	......	1	......	......	......
Hohokus	7	2	2	8	7	1	27	2,920	......	......	......	......	1	......	......	1	1	7	2	......	......	2	4	......	2	1	......	......
Lodi	18	8	6	18	13	......	63	4,071	......	2	2	......	......	......	......	2	9	6	8	7	2	3	4	2	3	4	......	......
Midland	4	2	2	13	4	......	25	1,591	......	1	......	......	......	......	......	......	2	6	1	1	3	......	5	......	2	......	......	......
New Barbadoes	20	11	10	24	14	......	79	4,250	......	1	......	......	1	......	......	......	7	16	11	8	3	5	7	1	7	1	......	......
Palisade	4	2	5	12	9	......	32	2,303	......	3	......	......	......	......	1	......	1	5	3	1	3	1	......	1	3	3	......	2
Ridgefield	8	5	8	16	9	......	41	3,953	......	2	......	......	1	......	......	......	8	7	8	8	3	1	2	......	1	......	......	......
Ridgewood	2	4	6	7	5	......	24	1,478	......	2	1	......	1	......	1	1	......	6	3	1	1	1	1	1	2	......	......	......
Saddle River	3	9	2	4	3	......	21	1,355	......	......	......	......	3	......	......	......	3	3	......	2	2	......	......	......	......	1	......	......
Union	17	3	3	14	13	......	50	3,164	......	6	2	......	......	1	......	......	6	7	2	4	1	2	2	......	4	......	......	......
Washington	6	2	......	23	9	1	41	2,853	......	3	1	......	......	......	1	1	......	12	5	2	1	......	7	......	1	2	......	1
Death rate per 1000 of county	......	......	......	......	......	......	......	......	13.86	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	110	67	50	172	107	4	510	......	......	22	7	......	10	1	4	10	46	94	58	38	25	18	40	5	31	14	......	6

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of BURLINGTON.

Population 55,403

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.
Bass River	8		1	3	3		15	1,006	
Beverly	2	4	3	1	4		14	†1,369	
Beverly City	6	10	6	4	13	1	40	1,759	
Bordentown	14	10	10	29	27		90	5,334	16.89
Burlington	22	18	12	36	22	3	113	7,237	15.61
Chester	9	4	2	9	12	2	38	2,855	
Chesterfield	3	1	3	6	10	1	24	1,525	
Cinnaminson	7	6	7	6	14	1	41	2,184	
Delran	2	5	2	2	1		12	1,760	
Evesham	2	2		7	6		17	1,602	
Florence	7	5	4	11	5	1	33	1,528	
Little Egg Harbor	4		3	4	4		16	1,881	
Lumberton	4	3	2	6	5		20	1,689	
Mansfield	7		1	13	8	1	30	1,648	
Medford	7	1		10	11		29	1,980	
Mount Laurel	3		1	7	6		17	1,739	
New Hanover	6	2	3	4	8		23	2,373	
Northampton	16	5	4	23	30		78	4,630	
Pemberton	14	6	2	18	22		62	2,885	
Randolph	3	1		1			5	428	
Shamong	2		1	4	4		11	1,097	
Southampton	5	5	2	7	5		24	2,270	
Springfield	3	1	4	4	1		13	1,886	
Washington	1	1	1	1	3		7	389	
Westhampton	6	1		4	3		14	715	
Willingboro	2	1	2	3	2		10	743	
Woodland			1	1	1		3	325	
Death rate per 1000 of county									14.42
Death rate per 1000 of county, exclusive of cities of over 5000									13.91
	103	93	77	224	230	10	799		

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bass River		1						2	3		1	1		2			1		
Beverly	1					1	5			2		1				2	1		
Beverly City							17	4	2	3		3		1		1	2		
Bordentown		1				1	1	9	24	6	11	9	4	4		5	1		2
Burlington		1		1			3	12	28	12	5	5	8	8	2	4		1	1
Chester	1			1			1		1	1	7	5	1	2		6			1
Chesterfield						1			6		1	1	2	4	2				1
Cinnaminson							9	1	6	2		1	1	2	1	4		1	1
Delran							6			1		2	1						
Evesham		1					1		5		1	3		2		2			
Florence	1	1		1		1	1	4	8	5	1	4	1	1				1	1
Little Egg Harbor							1	1	2	3		1		2	1	2			
Lumberton	1						1	2	2		1		1			2	4		
Mansfield	1	3				1		1	7	1	1	1	2	3		2	1		
Medford	1							4	6	4			1	7		1	1		
Mount Laurel	1	1						2	2		1	1	1	2	1	1	2	1	1
New Hanover									6	3	1	1	1	2		2			
Northampton		1						6	16	3	8	8	4	8	1	5	1	1	4
Pemberton	1	3		1			2	10	7	3	4	7	1	5		7			1
Randolph				1				2		2									
Shamong								1	4	1		1		1		1			
Southampton							1	1	5	7	3	2	1			1			
Springfield		2					2	1	1		1	1				2			
Washington								1	3	1						1			
Westhampton		1					1	1	2			1		1	1		1		
Willingboro							1	3	1			1		1	1	1			1
Woodland									2										
Death rate per 1000 of county																			
Death rate per 1000 of county, exclusive of cities of over 5000																			
	8	16		4		5	53	68	130	60	47	60	30	50	10	52	15	5	14

†Exclusive of city.

Return of Deaths from all Causes and certain specified Diseases, in the State of New Jersey, for the year ending June 30th, 1880.

County of CAMDEN. Population ... 62,941. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Camden	226	131	85	246	106	9	803	41,658	19.27	6	25	10	9	1	7	37	120	115	71	66	37	17	51		25	24	1	6
Centre	14	5	5	8	8	1	41	1,538		1	4						7	2	8	3		2	2		4			2
Delaware	2	2	1	5	3		13	1,481									1	2	3	1	2					1		
Gloucester Township	12	1	5	24	30		72	2,527			4						8	9	5		9	2	8	2	4	1		
Gloucester City	28	14	6	23	14		84	5,347	15.70		1				1	6	18	17	5	6	3		5		3	1		1
Haddon	12	4	4	13	14		47	2,551		1			1		1	1	3	10	6	3	2	1	3		7	1		1
Merchantville Borough								†3,093																				
Stockton	24	7	4	16	11		62	439		3	1						21	9	2	2	5	1	3		5	2		
Waterford	8	2	2	6	7		25	2,077					1			1	1	3	3	3	2		3		1			1
Winslow	12	2	3	7	13		37	2,230					2				6	1	5	3	1	1	5		4			
Death rate per 1000 of county									18.81																			
Death rate per 1000 of county, exclusive of cities over 5000									18.63																			
	338	168	115	347	206	10	1,184			11	35	10	13	1	9	45	185	168	108	87	61	24	80	2	53	30	1	11

†To be included in Stockton township.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of CAPE MAY. Population.........9,765. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung disease.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Cape May City	6	5	5	5	3	......	24	1,699	....	1	1	......	4	......	......	1	3	......	1	3	......	1	2	1	2	2	......	......
Dennis	4	1	....	3	3	......	11	1,812	....	......	1	......	......	......	1	......	3	1	1	......	......	......	......	......	1	2	......	......
Lower	13	6	3	3	2	......	27	1,977	....	......	1	......	3	......	2	......	6	4	......	5	......	......	1	......	......	1	......	......
Middle	8	5	7	2	13	2	37	2,575	....	......	......	......	1	......	......	6	6	4	4	2	1	1	4	......	5	1	......	......
Upper	6	2	2	9	8	......	27	1,702	......	......	1	......	......	......	......	......	3	3	2	3	......	1	4	......	2	1	1	......
Cape May Point	....	....	....	....	....	......	....	†198	....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county	....	....	....	....	....	......	....	....	12.90	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	37	19	17	22	29	2	126	....	....	1	4	......	8	......	3	7	21	12	8	13	1	3	11	1	10	7	1	......

†Included in population of Lower township.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of CUMBERLAND. Population.......37,694. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhœal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bridgeton	48	15	11	43	38	......	155	8,729	17.75	......	2	......	4	......	3	9	21	28	14	9	6	4	10	2	6	3	1	4
Commercial	11	1	6	6	7	......	31	2,265	....	......	......	......	......	......	......	4	1	6	4	2	......	......	4	......	2	......	......	......
Deerfield	5	1	....	2	7	1	16	1,643	....	......	......	......	......	......	......	......	2	2	4	1	......	......	2	......	1	......	......	......
Downs	5	....	....	6	7	......	18	1,687	....	......	......	......	......	......	......	......	......	2	5	1	2	......	......	......	2	......	1	......
Fairfield	7	3	1	10	12	1	34	3,215	....	1	4	......	......	......	......	......	4	2	......	3	3	......	5	......	4	1	......	......
Greenwich	1	4	1	6	7	......	19	1,245	....	......	2	......	......	......	2	......	1	3	3	......	......	......	1	......	2	......	......	1
Hopewell	4	....	....	6	13	......	23	1,764	....	......	......	......	......	......	......	......	2	7	2	......	4	1	4	......	1	......	......	......
Landis	18	8	6	29	32	......	93	6,005	....	......	2	......	1	......	......	......	4	14	12	9	6	1	9	......	5	10	......	2
Maurice River	8	2	2	11	13	......	36	2,374	....	......	1	......	......	......	......	1	1	8	4	2	3	......	3	......	5	2	......	......
Millville	39	55	15	38	24	3	174	7,060	22.71	......	2	......	13	......	......	21	28	36	22	10	3	3	6	......	8	1	1	......
Stoe Creek	2	1	1	3	5	......	12	1,107	....	1	......	......	......	......	......	1	1	......	1	......	1	......	1	......	2	......	......	1
Death rate per 1000 of county	....	....	....	....	....	......	....	....	16.20	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 of county, exclusive of cities of over 5000.	....	....	....	....	....	......	....	....	13.23	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	148	90	43	160	165	5	611	....	....	2	13	......	18	......	5	36	65	108	71	37	28	9	45	2	38	17	3	8

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of ESSEX.

Population..........189,819.

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.
Belleville	9	10	6	9	11	......	45	3,004	....
Bloomfield	17	10	3	21	29	1	81	5,748	....
Caldwell	6	1	1	11	17	......	36	3,167	....
Clinton	9	2	4	9	14	......	38	2,742	....
East Orange	22	10	13	26	30	......	101	8,349	12.09
Franklin	3	3	1	3	6	......	21	1,617	....
Livingston	4	2	....	3	4	......	13	1,401	....
Millburn	2	2	1	7	8	......	20	1,743	....
Montclair	18	5	4	30	24	......	81	5,146	....
Newark	641	373	222	899	414	4	2,553	136,400	18.71
Orange	55	30	22	77	32	......	216	13,206	16.35
South Orange	9	8	3	15	14	......	49	3,911	....
West Orange	5	5	6	15	10	......	41	3,385	....
Death rate per 1000 for county	....	....	....	....	....	......	....	....	17.35
Death rate per 1000 for county, exclusive of cities of over 5000.	....	....	....	....	....	......	....	....	13.33
	800	461	286	1,130	613	5	3,295	....	....

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Belleville	5	......	......	......	......	1	7	2	4	7	3	2	2	1	1	2	1	......	......
Bloomfield	2	......	......	2	1	1	......	10	6	16	6	6	3	9	2	1	2	......	1
Caldwell	2	1	......	......	......	......	2	3	5	5	2	4	1	4	......	1	1	......	1
Clinton	1	......	......	......	......	......	4	2	6	4	3	3	2	5	1	1	1	......	......
East Orange	2	7	......	1	1	......	3	11	15	11	4	8	4	4	2	4	......	......	4
Franklin	1	......	......	......	......	......	1	1	3	4	3	......	1	4	1	1	1	......	......
Livingston	......	......	......	......	......	......	......	3	3	1	2	1	1	2	......	1	......	......	......
Millburn	1	......	......	2	......	......	......	1	1	2	2	......	......	7	......	......	......	1	......
Montclair	1	5	......	......	......	......	5	7	10	8	5	4	4	9	......	3	3	......	3
Newark	48	72	......	35	3	11	144	298	396	308	251	121	82	178	5	115	62	5	27
Orange	2	3	......	2	1	1	3	39	47	37	16	6	4	13	2	10	4	......	1
South Orange	2	2	......	1	1	......	2	4	6	5	2	4	3	2	1	1	1	......	1
West Orange	......	1	......	......	......	1	1	3	9	5	4	4	3	1	1	3	......	1	1
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 for county, exclusive of cities of over 5000.	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	67	100	......	43	7	15	172	384	511	413	303	163	110	239	16	143	76	7	39

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of GLOUCESTER. Population ....25,886. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.
Clayton	8	8	2	7	9	......	34	1,981	....
Deptford	3	2	1	8	8	......	22	1,520	....
Franklin	11	8	2	5	8	......	34	2,480	....
Glassboro	17	3	4	4	2	......	30	2,088	....
Greenwich	7	6	5	15	17	2	52	2,508	....
Harrison	3	1	....	11	12	......	27	2,841	....
Logan	5	3	2	2	7		19	1,765	....
Mantua	7	3	2	5	5	1	23	1,718	....
Monroe	9	6	3	11	6	......	35	1,858	....
Washington	7	1	2	6	2	......	18	1,366	....
West Deptford	3	3	5	8	6	1	26	1,309	....
Woodbury	9	1	3	9	5	......	27	2,298	....
Woolwich	2	2	1	12	11	......	28	1,974	....
Death rate per 1000 for county	....	....	....	....	....	......	....	....	14.48
	91	47	32	103	98	4	375	....	.....

PRINCIPAL CAUSES OF DEATH.

Statistical Divisions.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.
Clayton	......	1	......	......	......	......	5	3	7	5
Deptford	2	......	......	......	......	......	......	1	1	5
Franklin	......	......	......	2	......	......	5	4	3	3
Glassboro	......	1	......	3	......	......	4	6	3	4
Greenwich	1	2	......	1	......	1	1	5	5	3
Harrison	......	3	......	......	......	1	......	......	2	3
Logan	......	......	......	1	......	......	1	......	3	3
Mantua	......	2	......	......	1	......	1	1	......	......
Monroe	......	2	......	......	......	......	2	7	7	5
Washington	......	......	......	......	......	......	......	4	3	2
West Deptford	3	......	......	......	......	......	......	2	......	1
Woodbury	......	1	......	......	......	......	1	2	3	4
Woolwich	......	1	......	......	......	......	1	......	8	1
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......	......
	6	13	......	7	1	2	21	35	45	39

Statistical Divisions.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Clayton	1	......	......	2	......	3	1	......	......
Deptford	1	......	1	1	......	3	......	......	......
Franklin	1	3	1	3	......	1	......	......	......
Glassboro	3	2	......	......	1	1	......	......	......
Greenwich	3	6	1	7	......	......	1	1	......
Harrison	......	3	......	3	......	6	1	......	......
Logan	......	......	1	......	......	1	2	1	......
Mantua	......	2	2	3	......	4	......	......	......
Monroe	4	2	......	1	......	3	......	......	......
Washington	......	1	......	1	......	4	......	......	......
West Deptford	3	2	......	4	......	2	1	1	2
Woodbury	2	......	1	2	......	1	1	......	......
Woolwich	1	4	2	1	......	4	......	......	......
Death rate per 1000 for county	......	......	......	......	......	......	......	......	......
	19	25	9	28	1	33	7	3	2

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of HUDSON. Population......187,950. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent fever, etc.	PRINCIPAL CAUSES OF DEATH. Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Bayonne	37	33	2	53	16	......	141	9,372	15.04	1	......	......	3	......	2	10	19	22	14	16	5	1	5	1	6	3	......	2
Guttenberg	9	4	1	10	3	......	27	1,206	....	1	1	......	......	......	......	......	7	1	3	2	2	1	2	......	......	1	......	......
Harrison	30	17	14	53	13	2	129	5,510	23.41	7	2	......	1	1	......	......	11	20	19	12	6	3	6	......	5	2	......	2
Hoboken	208	150	64	244	68	......	734	30,999	23.71	5	8	......	23	5	6	49	107	76	93	192	37	27	28	7	29	12	3	13
Jersey City	644	525	267	798	295	4	2,533	120,728	20.98	57	31	......	148	23	16	164	292	344	269	265	114	66	109	12	101	35	8	31
Kearney	2	3	4	10	5	......	24	2,165	....	1	......	......	......	......	......	......	1	2	6	3	1	......	......	......	2	3	......	......
North Bergen	26	13	17	52	45	1	164	4,268	....	6	3	......	8	2	......	......	19	29	16	8	5	9	17	2	9	5	......	1
Town of Union	36	41	17	23	14	......	121	5,849	20.68	4	2	......	17	3	......	5	14	12	9	14	4	3	7	......	4	3	......	1
Union	8	4	7	7	3	......	29	1,310	....	......	1	......	5	......	......	3	4	4	5	1	......	3	1	......	......	......	......	......
Weehawken	7	8	6	12	2	......	35	1,102	....	3	......	......	3	......	1	2	3	......	6	3	1	......	1	......	......	......	......	3
West Hoboken	27	14	8	25	14	......	88	5,441	16.17	1	2	......	3	......	......	4	9	7	8	16	8	1	1	......	6	3	1	1
Death rate per 1000 of county	....	....	....	....	....	......	....	....	21.41	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 of county, exclusive of cities	....	....	....	....	....	......	....	....	23.68	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	1,034	812	407	1,287	478	7	4,025	....	....	86	50	......	211	34	25	237	486	516	448	532	183	114	177	22	102	67	12	54

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of HUNTERDON. Population .... 38,568. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census, of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Alexandria	3		1	4	9		17	1,324			2		1				1	1	3		3		4		1			
Bethlehem	4	6	8	15	12		45	2,830			3		1			2	7	8	3		3	2	5	1	5	1		
Clinton Township	3	1		2	5		11	2,133								1	1	1	1	2	2				1			
Clinton Borough	2			4	5	1	12	842									2	4			1				1	1		
Delaware	3	3	2	10	12	1	31	3,092		1	2						2	1	2		1		4		3	1	1	1
East Amwell	7	1	2	3	10	1	24	1,696								3		2		1	2	2	3		1			
Franklin	3	1	2	5	6		17	1,338									2	3	2	1	1		4		1			
Frenchtown	1	1		3	5		10	1,039										3		1			4					
High Bridge	4	2		10	5		21	2,209							1	1		4	2	1	3	1	1			2	1	1
Holland	3	9	5	5	6		28	1,886					5		1	6	1	2	1	1	4		2		1		1	
Kingwood	2	2		3	8		15	1,694									2	1	4		4		1			1		
Lambertville	13	12	18	17	18		78	4,183			2					19	6	11	5	3	3		6		2	2		
Lebanon	8	3	2	13	8	2	36	2,699		1	3						9	5	5		4		3		2	1		
Raritan	6	1	4	17	15		43	4,186			1				1		4	8			6	3	6	1	2	1		
Readington	5	3	1	13	18		40	3,103							1		1	3	4		4		5		6	3		1
Tewksbury	5	1	3	3	7		19	2,108										5	4	1	1		3		1			
Union		1		4	5		10	1,167			1		1					4	1		1		1					
West Amwell	3	5	3	3	4		18	1,039								4	1	1	6				2		1			
Death rate per 1000 for county									12.31																			
	75	52	51	134	158	5	475			2	14		8		4	36	39	67	43	11	43	8	54	2	28	13	3	3

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of MERCER. Population.........58,058. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrheal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Chambersburg	25	14	19	38	9	4	109	5,437	20.04		5		14	1	2	2	9	17	12	7	3		6	1	7	2		1
East Windsor	8	6	1	4	16		35	2,271							1	1	3	5	5	1	1		1	2	4		1	1
Ewing		1		20	9		30	2,412										4	2		3		†16		3			
Hamilton	7	3	7	22	14	1	54	3,370			1						7	13	5	3	4	2	3		5	1		2
Hopewell	6	3	3	13	15	1	41	4,462							1		2	6		1	2	1	9		3	3		1
Lawrence	11	6	2	12	14	2	47	3,171			1		6				4	7	6	6	3	1	2		4			
Princeton	20	9	10	16	26		81	4,348			7		2	1		2	10	8	11	5	6		6		6	1		1
Trenton	138	75	75	196	118	16	618	29,910	20.66	5	5		66	1	2	6	54	108	43	40	31	16	38	3	33	11	2	7
Washington	2	1	2	5	8		18	1,281							1	1		3	1			1	3		5	2		
West Windsor	2	2		5	6		15	1,396								1	2	3				2	3		2			
Death rate per 1000 of county									18.05																			
Death rate per 1000 of county, exclusive of cities over 5000									14.13																			
	219	120	119	831	235	24	1,048			5	19		88	3	7	13	91	174	85	63	53	23	87	6	72	20	3	13

†Excess of adult brain deaths in Ewing belongs to asylum.

County of MIDDLESEX. Population.........52,286. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Cranbury	4	3	2	11	8	......	28	1,599	....	......	......	......	1	......	......	......	......	7	7	......	2	1	2	......	2	......	......	......
East Brunswick	9	7	5	15	12	......	48	3,272	....	2	......	......	1	......	......	3	2	7	3	2	......	1	3	......	4	2	......	1
Madison	4	2	2	6	8	......	22	1,662	....	......	......	......	......	......	......	......	2	1	3	2	2	1	2	......	2	......	1	......
Monroe	6	5	4	15	13	1	44	3,016	....	1	2	......	1	......	1	3	1	11	4	......	3	1	1	......	3	2	......	......
New Brunswick	93	32	24	65	55	......	269	17,167	15.66	2	6	......	1	6	......	8	45	36	27	24	14	9	17	4	13	11	......	1
North Brunswick	5	1	2	6	6	......	20	1,251	....	......	1	......	......	......	......	......	1	4	2	2	2	......	4	......	......	......	......	......
Perth Amboy	29	8	5	22	18	1	83	4,808	....	1	1	......	1	......	......	2	14	6	12	7	4	1	6	......	6	1	......	......
Piscataway	5	5	3	17	15	1	46	3,242	....	1	1	......	......	......	1	......	3	9	2	2	1	3	2	......	3	......	......	......
Raritan	11	1	4	12	18	......	46	3,789	....	1	......	......	......	......	......	1	1	7	4	1	3	1	4	1	2	......	......	......
Sayreville	5	3	7	7	4	......	26	1,930	....	2	......	......	......	......	......	7	1	......	1	1	......	1	......	......	......	1	......	2
South Amboy	9	13	6	17	6	1	52	3,648	....	3	......	......	......	......	......	9	6	5	6	1	3	5	2	......	1	1	......	......
South Brunswick	8	9	4	12	16	......	49	2,803	....	1	......	......	3	......	......	3	6	6	4	3	......	1	6	1	2	2	......	1
Woodbridge	13	4	7	8	12	......	44	4,099	....	2	......	......	......	......	......	......	5	3	8	2	3	......	5	......	......	2	......	......
Death rate per 1000 of county	......	......	......	......	......	......	......	......	14.86	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 of county, exclusive of cities of over 5000.	......	......	......	......	......	......	......	......	14.46	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	201	93	75	213	191	4	777	....	....	16	11	......	8	6	2	36	87	102	83	47	37	25	54	6	38	23	1	5

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of MONMOUTH. Population.........55,535 Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Atlantic	3			1	2		6	1,743			1									2	1				1			
Eatontown	10	3	3	10	15		41	2,637								1	5	10	3	1	2	2	4		5			
Freehold	7	9	5	17	22	7	67	4,302					1		1	1	5	11	3	5	3	3	8		11		1	3
Holmdell	2	1	2	3	5		13	1,575									1	2		2	1		3		1	1		
Howell	14	4	2	14	9	1	44	3,374			1					1	7	6	6	3	1	2	2		3	1		3
Manalapan	7	4	1	9	13		34	2,117			1						2	8	2		6	1	2		2			
Marlboro	11		1	6	9		27	2,193					1				4	5	1	3	2	1	3		1			
Matawan	13	8	2	10	14	1	48	2,699			1					1	6	10	4	5	4	1			1	1		1
Middletown	17	1	10	13	21		62	5,059								5	11	11	3		3	1	3		7	2		1
Millstone	10	3	2	8	11		34	2,080							1	1	8	3	3	4	2		2		4	1		1
Neptune	18	19	4	15	5	2	63	4,187					2			5	22	7	2	5	3	1	1	1	4	2		
Ocean	24	6	7	28	17	1	83	6,027			1				1		7	13	4	7	4	7	8	1	1			
Raritan	19	9	3	16	13	1	61	3,891			2		1		1	2	12	11	2	6	2	4	2		2	1	1	2
Shrewsbury	20	10	5	14	24		73	6,526					1		1	1	9	8	5	6	5	1	9		5	4		3
Upper Freehold	3	3	4	20	17	2	49	3,236		1	1							16	3	3	1		7		4	2		
Wall	17	7	5	9	9		47	3,829								4	3	7	3	5	2		5		4			1
Death rate per 1000 of county									13.54																			
	105	87	56	193	206	15	752			1	8		6		5	22	102	128	44	57	42	24	58	2	56	15	2	15

Jersey, for the year ending June 30th, 1880.

County of MORRIS. Population ..... 50,867. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Boonton	5	6	4	13	14	1	43	2,685		1			1				4	6	6	2	2	3	3		2	1		
Chatham	19	8	5	19	23		74	4,277		1	3				5	1	2	12	8	6	8	2	7	1	5	2		1
Chester	3	2	1	13	4		23	2,337		1	1							5	2	2	1		2	1	1	1	2	2
Hanover	10	2	1	5	21	2	41	4,138		2				1			4	4	6	2	2	3	5		2	3		
Jefferson	4	1	6	9	5	2	27	1,792									2	6	5		2		3	1	2	1		2
Mendham	1	3		5	12		21	1,526							1			1	2	2	4	1	1		4			1
Montville	3			3	4		10	1,270		2							1	1		1			2					
Morristown	22	11	6	52	36	1	128	6,838	18.71	2						4	17	19	9	6	6	5	†34		5	3	1	
Mount Olive	6	3		11	5	1	26	1,982		3	1						4	4	1	1	2	1	4			1		
Passaic	5	1	1	2	7		16	1,896								2	4	2	1	1			2		3			
Pequannock	5	6	3	6	6	1	27	2,239		2	2		1			4		2	1	1	1	2	2		2			1
Randolph	28	22	8	34	16		108	7,701		2	2		4	6	1	5	9	12	14	9	7	2	4		8	5		2
Rockaway	22	16	9	23	19	1	90	7,366		4			3	3		1	10	8	25	6	2	1	4	1	5	2		4
Roxbury	6	5	6	11	5		33	2,139			1					1	2	3	7	3	3	1	2		1	1	1	
Washington	4		2	4	8		18	2,681					1				1	2	4	1	2		5					1
Death rate per 1000 of county									13.26																			
Death rate per 1000 of county exclusive of cities over 5000									12.65																			
	143	86	52	210	185	9	685			20	10		10	10	7	18	60	87	91	43	42	21	80	4	40	20	4	14

† Eight at asylum of adult brain disease.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of MONMOUTH. Population... 55,535. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Atlantic	3	......	......	1	2	......	6	1,743	......	......	1	......	......	......	......	......	......	......	......	2	1	......	......	......	1	......	......	......
Eatontown	10	3	3	10	15	......	41	2,637	......	......	......	......	......	......	......	1	5	10	3	1	2	2	4	......	5	......	......	......
Freehold	7	9	5	17	22	7	67	4,302	......	......	......	......	1	......	1	1	5	11	3	5	3	3	8	......	11	......	1	3
Holmdell	2	1	2	3	5	......	13	1,575	......	......	......	......	......	......	......	......	1	2	......	2	1	......	3	......	1	1	......	......
Howell	14	4	2	14	9	1	44	3,374	......	......	1	......	......	......	......	1	7	6	6	3	1	2	2	......	3	1	......	3
Manalapan	7	4	1	9	13	......	34	2,117	......	......	1	......	......	......	......	......	2	8	2	......	6	1	2	......	2	......	......	......
Marlboro	11	......	1	6	9	......	27	2,193	......	......	......	......	1	......	......	......	4	5	1	3	2	1	3	......	1	......	......	......
Matawan	13	8	2	10	14	1	48	2,699	......	......	1	......	......	......	......	1	6	10	4	5	4	1	......	......	1	1	......	1
Middletown	17	1	10	13	21	......	62	5,059	......	......	......	......	......	......	......	5	11	11	3	......	3	1	3	......	7	2	......	1
Millstone	10	3	2	8	11	......	34	2,080	......	......	......	......	......	......	1	1	8	3	3	4	2	......	2	......	4	1	......	1
Neptune	18	19	4	15	5	2	63	4,187	......	......	......	......	2	......	......	5	22	7	2	5	3	1	1	1	4	2	......	......
Ocean	24	6	7	28	17	1	83	6,027	......	......	1	......	......	......	1	......	7	13	4	7	4	7	8	1	1	......	......	......
Raritan	19	9	3	16	13	1	61	3,891	......	......	2	......	1	......	1	2	12	11	2	6	2	4	2	......	2	1	1	2
Shrewsbury	20	10	5	14	24	......	73	6,526	......	......	......	......	1	......	1	1	9	8	5	6	5	1	9	......	5	4	......	3
Upper Freehold	3	3	4	20	17	2	49	3,236	......	1	1	......	......	......	......	......	......	16	3	3	1	......	7	......	4	2	......	......
Wall	17	7	5	9	9	......	47	3,829	......	......	......	......	......	......	......	4	3	7	3	5	2	......	5	......	4	......	......	1
Death rate per 1000 of county	......	......	......	......	......	......	......	......	13.54	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	195	87	56	193	206	15	752	......	......	1	8	......	6	......	5	22	102	128	44	57	42	24	58	2	56	15	2	15

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of MORRIS. Population.....50,867. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	PRINCIPAL CAUSES OF DEATH. Death rate per 1000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Boonton	5	6	4	13	14	1	43	2,685	...	1	...	...	1	...	...	...	4	6	6	2	2	3	3	...	2	1	...	...
Chatham	19	8	5	19	23	...	74	4,277	...	1	3	...	...	...	5	1	2	12	8	6	8	2	7	1	5	2	...	1
Chester	3	2	1	13	4	...	23	2,337	...	1	1	...	...	...	...	...	...	5	2	2	1	...	2	1	1	1	2	2
Hanover	10	2	1	5	21	2	41	4,138	...	2	...	...	...	1	...	...	4	4	6	2	2	3	5	...	2	3	...	...
Jefferson	4	1	6	9	5	2	27	1,792	...	...	...	...	...	...	...	...	2	6	5	...	2	...	3	1	2	1	...	2
Mendham	1	3	...	5	12	...	21	1,536	...	...	...	...	...	...	1	...	...	1	2	2	4	1	1	...	4	...	...	1
Montville	3	...	...	3	4	...	10	1,270	...	2	...	...	...	...	...	...	1	1	...	1	...	...	2	...	...	...	...	...
Morristown	22	11	6	52	36	1	128	6,838	18.71	2	...	...	...	...	...	4	17	19	9	6	6	5	†34	...	5	3	1	...
Mount Olive	6	3	...	11	5	1	26	1,982	...	3	1	...	...	...	...	...	4	4	1	1	2	1	4	...	...	1	...	...
Passaic	5	1	1	2	7	...	16	1,806	...	...	...	...	...	...	...	2	4	2	1	1	...	...	2	...	3	...	...	...
Pequannock	5	6	3	6	6	1	27	2,239	...	2	2	...	1	...	...	4	...	2	1	1	1	2	2	...	2	...	...	1
Randolph	28	22	8	34	16	...	108	7,701	...	2	2	...	4	6	1	5	9	12	14	9	7	2	4	...	8	5	...	2
Rockaway	22	16	9	23	19	1	90	7,366	...	4	...	...	3	3	...	1	10	8	25	6	2	1	4	1	5	2	...	4
Roxbury	6	5	6	11	5	...	33	2,139	...	...	1	...	...	...	...	1	2	3	7	3	3	1	2	...	1	1	1	...
Washington	4	...	2	4	8	...	18	2,681	...	...	...	...	1	...	...	...	1	2	4	1	2	...	5	...	...	...	...	1
Death rate per 1000 of county	...	...	...	...	...	...	...	...	13.26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Death rate per 1000 of county exclusive of cities over 5000	...	...	...	...	...	...	...	...	12.65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	143	86	52	210	185	9	685	...	...	20	10	...	10	10	7	18	60	87	91	43	42	21	80	4	40	20	4	14

† Eight at asylum of adult brain disease.

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending June 30th, 1880.

County of OCEAN. Population 14,455. Statistical Divisions.	DEATHS AT ALL AGES.							Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Berkley	4	1		3	4		12	683									1	1	1				1		2			
Brick	6	5	4	14	13		42	2,990			1					2	1	10	5	2	1	1	6	2	4		1	1
Dover	1	3	5	8	7		24	2,439		1	1					1	2	5		1			3		1	1		
Englewood	1			3	3		7	592									1	2			1				1	1		
Jackson	7	1	1	5	5		19	1,803			1					2	1	2	1		1		3		2			1
Lacey	2			1	3	1	7	814							1			1			1				1	1		
Manchester	4	1	1	2	3		11	1,057									2		2	1					3	1		
Ocean	1			2			3	484			1						1								1			
Plumsted	1	2	1	8	4		16	1,561					1		1			4		1	1		2		2	1		
Stafford	2	1		1	4		8	1,008							2			1	1		1		1					
Union	4	2	2	3	2		13	1,024								1	3	2	1	1			1		1		1	
Death rate per 1000 of county									11.20																			
	33	16	14	50	48	1	162			1	4		1		4	6	12	28	11	6	6	1	17	2	13	5	2	2

County of PASSAIC.

Population ....68,716.

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Acquacknock	1	1	3	7	6	......	28	1,781	....	1	......	......	......	......	......	......	1	2	1	2	1	2	3	......	......	1	......	......
Little Falls	6	1	2	14	8	......	31	1,404	....	2	......	......	......	......	......	1	3	3	2	1	2	1	1	1	2	......	......	1
Manchester	2	1	4	5	1	......	13	1,313	....	......	......	......	......	......	......	1	1	1	2	2	......	1	2	......	1	......	......	1
Passaic City	43	26	13	44	14	2	142	6,532	21.73	1	2	......	1	......	......	10	22	14	13	22	8	3	3	3	8	1	......	4
Paterson	305	247	152	296	170	4	1,174	50,887	23.07	7	20	......	82	22	11	56	202	152	119	101	48	24	62	3	37	22	2	12
Pompton	7	3	2	4	5	......	21	2,251	....	......	......	......	2	......	......	......	2	4	2	1	2	......	......	1	2	2	......	......
Wayne	4	3	4	6	5	......	22	1,757	....	1	......	......	......	......	......	2	1	2	4	3	1	......	1	......	3	......	......	......
West Milford	9	6	2	9	11	......	37	2,591	....	......	......	......	......	......	......	......	6	2	3	5	2	1	......	3	3	2	1	1
Death rate per 1000 of county	....	....	....	....	....	......	....	....	21.36	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Death rate per 1000 of county exclusive of cities over 5000	....	....	....	....	....	......	....	....	13.44	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	377	288	182	305	220	6	1,408	....	....	12	22	......	85	22	11	70	238	180	146	137	64	32	72	11	56	28	3	19

County of SUSSEX. Population 23,553. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.	PRINCIPAL CAUSES OF DEATH. Remittent feves, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	cute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Andover	1	...	1	4	2	...	8	1,150	...	...	1	...	...	...	...	1	...	3	2	...	...	...	1	...	...	...	...	...
Byram	3	5	2	3	4	...	17	1,406	...	2	1	...	3	...	...	...	1	2	2	2	...	1	...	...	...	...	...	...
Frankford	2	1	3	11	8	...	25	1,680	...	...	1	...	...	...	...	...	...	2	2	...	3	1	1	...	2	1	...	...
Greene	...	1	...	2	5	...	8	727	...	...	...	...	...	...	...	...	...	2	1	...	1	...	2	...	1	...	...	...
Hardyston	7	1	2	14	13	2	39	2,645	...	2	1	...	...	...	...	...	2	9	7	2	2	...	3	...	5	2	...	1
Hampton	2	1	...	1	5	...	9	893	...	...	...	...	...	...	...	1	1	...	1	...	1	...	2	1	1	...	...	1
Lafayette	2	...	...	2	4	...	8	780	...	...	...	...	...	...	...	...	...	1	1	...	2	...	2	...	...	1	...	...
Montague	3	3	2	1	6	1	16	1,022	...	...	...	...	4	...	...	...	1	2	1	...	...	...	1	...	...	...	1	...
Newton	6	2	3	11	8	...	30	2,513	...	...	3	...	...	...	...	2	2	6	2	...	...	1	4	...	1	1	...	1
Sandystone	2	4	4	4	2	...	16	1,195	...	...	...	...	5	...	...	...	1	1	1	3	1	...	2	...	...	1	...	...
Sparta	3	4	4	7	10	...	28	2,274	...	1	...	...	...	...	...	...	1	4	4	4	1	1	6	...	...	1	1	...
Stillwater	3	2	2	6	6	...	19	1,502	...	...	1	...	...	...	...	...	...	2	5	...	2	...	3	...	...	...	...	...
Vernon	...	2	4	3	5		14	1,828	...	...	...	...	2	...	...	3	...	...	1	2	1	...	1	...	2	...	...	1
Walpack	1	...	2	1	1	...	5	575	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...
Wantage	4	4	10	11	13	...	42	3,361	...	2	4	...	1	...	...	1	1	4	7	8	1	1	5	...	...	1	...	1
Death rate per 1000 of county	...	...	...	...	...	...	...	...	12.05	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	39	30	39	81	92	3	284	...	...	7	12	...	15	...	...	8	11	38	37	21	15	5	35	1	12	8	2	5

County of UNION.

Population .... 55,571.

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.
Clark	2						2	353	
Crawford			1	8	2		11	1,184	
Elizabeth	110	74	36	131	86	3	440	28,229	15.58
Fanwood	3		1	5	7		16	1,167	
Linden	7	4	2	7	8		28	1,880	
New Providence	4				7		11	781	
Plainfield	24	9	10	36	18	1	98	8,126	12.06
Rahway	32	8	5	34	37		116	6,454	17.97
Springfield		4		10			23	844	
Summit	5	4	2	8		1	27	1,910	
Union	8	3	2	7	8		28	2,418	
Westfield	9	3	2	15	11		40	2,216	
Death rate per 1000 of county									15.11
Death rate per 1000 of county, exclusive of cities of over 5000.									14.57
	204	109	61	261	200	5	840		

PRINCIPAL CAUSES OF DEATH

Statistical Divisions.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Clark								1											
Crawford	3									1	1	1		2		1			1
Elizabeth	5	6		2	2	9	24	52	40	44	39	24	7	35		21	11	1	7
Fanwood									3	3	2	1	1						
Linden		2				1		3	3		1	3		1					2
New Providence								1		2			1	2			1		
Plainfield	2	4					2	13	19	9	7	5	3	9		5	1	1	1
Rahway	2					2	1	9	26	12	6	7		10	1	15	5		3
Springfield				1			2		2	6		2		6					
Summit	1								5	2		2	2	4	1				
Union	1						2	4	2	1	1	4				3	1		
Westfield	1	6	1				1	3	6	3	3	2	3	4			2		1
Death rate per 1000 of county																			
Death rate per 1000 of county, exclusive of cities of over 5000.																			
	15	18	1	3	2	12	32	86	115	83	60	51	17	73	2	45	21	2	15

County of WARREN. Population 36,588. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1000.
Allamuchy	1		2	2	1		6	648	
Belvidere	7	6	1	11	5	1	31	1,773	
Blairstown	2	1	1	4	3	1	12	1,455	
Franklin	4	4	2	4	6		20	1,529	
Frelinghuysen	2	2	1	3	5	1	14	1,042	
Greenwich	11	17	2	11	11		52	2,554	
Hackettstown	3	6	1	11	7	1	29	2,502	
Hardwick				2	5		7	583	
Harmony	2	1	1	3	4	1	12	1,350	
Hope	5	2	2	5	6		20	1,570	
Independence		2	1	7	2		12	1,018	
Knowlton	2	2	1	8	6		19	1,476	
Lopatcong	3	7	2	5	4	1	22	1,591	
Mansfield	9	3	1	7	8	1	29	1,709	
Oxford	21	16	7	19	14	1	78	4,593	
Pahaquarry	2		1	1			4	418	
Phillipsburg	39	25	21	21	20		126	7,180	17.54
Borough of Washington	4	3	3	11	6	1	28	2,142	
Washington Township	3			4	4		11	1,452	
Death rate per 1000 of county									14.54
Death rate per 1000 of county, exclusive of cities of over 5000.									13.80
	120	97	50	139	117	9	532		

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and Diphtheria.	Diarrhoeal diseases.	Consumption.	Acute Lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and Spinal diseases.	Erysipelas.	Digestive and Intestinal diseases.	Cancer.	Acute Rheumatism.	Puerperal.
Allamuchy									3		1			1		1			
Belvidere		1				1	2	1	4	6	1	2	1	2		3		1	
Blairstown							1		1		1		1	3		1	2		
Franklin		2		1			1	2	1	1	3	2				2			
Frelinghuysen		1						2		1	3	1	1	1	1	1			
Greenwich	1			5		1		6	4	10	4	2		4		2	1		1
Hackettstown								1	4	3	9	3	1	2					1
Hardwick									1		2		1	1		2			
Harmony				1						3				1		2		1	
Hope				1					1	5	4	2	1	1					
Independence		2									1	4	1	1		2			1
Knowlton									1	1	2	2	1	1		3			
Lopatcong		1		5				1		5			1	3		1			
Mansfield		1					1	3	4	3	1	2	3	3		1			
Oxford	2	6		2			3	13	5	7	5	3	1	1		6	1		
Pahaquarry								1	1	1	1								
Phillipsburg		2		15		3	11	9	11	6	22	3	2	10		10	1		1
Borough of Washington	1						2	2	6	3		2	1	2	1		1		2
Washington Township									3	1	1	2		1					1
Death rate per 1000 of county																			
Death rate per 1000 of county, exclusive of cities of over 5000.																			
	4	16		30		5	21	41	50	56	61	30	16	38	2	37	6	2	7

INDEX.

GENERAL INDEX TO SUBJECTS.

ALPHABETICAL INDEX.